



ENGEO

Combined Preliminary & Detailed Environmental Site Investigation

234 Rangiora Road

Ōtaki

Kāpiti Coast

Submitted to:

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1 Introduction

ENGEO Ltd was requested by Classic Developments NZ Ltd to undertake a Combined Preliminary and Detailed Environmental Site Investigation (PSI / DSI) at the location of a proposed subdivision in Ōtaki (herein referred to as 'the site'). This work has been carried out in accordance with our signed agreement, dated 18 February 2021.

We understand it is proposed to construct and develop a subdivision at the site consisting of approximately 46 properties.

This investigation has been undertaken to satisfy the requirements of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011, herein referred to as the "NES" (NES, 2011) and was undertaken in general accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand (MfE, 2011a).

Geotechnical testing and a site assessment were undertaken in conjunction with the environmental investigation and the findings are detailed in the ENGEO report 18634.000.001_01.

1.1 Objective of the Investigation

The objective of this investigation was to identify and evaluate conditions indicative of releases and threatened releases of hazardous substances at, or to the subject property, assess if contamination is present by testing soil samples obtained from the site, and report on the associated potential risk posed to future site users and the environment.

1.2 Approach

To satisfy the above objective, ENGEO gathered information regarding the following:

- Local evidence to provide baseline data on current soil and groundwater quality near the site;
- Past and present activities at the site that involved the storage, production, use, treatment or disposal of materials that could contaminate the site, including neighbouring site activities;
- The site condition inclusive of the contents and results of any known previous assessments; and
- Quantitative evidence on the likelihood of contamination being present on site.

1.3 Review of Site Information

During this investigation, information relating to the site's past and present uses were gathered from the following:

- The Greater Wellington Regional Council's (GWRC) Selected Land Use Register (SLUR);
- Online and / or archived records held by Kāpiti Coast District Council (KCDC), Land Information New Zealand (LINZ) and New Zealand Archives;
- Readily available online historical aerial photographs and published geological information; and
- Site walkover assessment.

1.4 Intrusive Soil Sampling (DSI)

Soil sampling was undertaken during the DSI to:

- Assess if contamination is present by testing soil samples obtained from the site from the geotechnical boreholes and additional shallow boreholes;
- Evaluate the need for remediation;
- Evaluate the requirement for NES related resource consents for the redevelopment works; and
- Confirm the disposal route if any material is required to be disposed of from the site.

2 Site Description and Setting

The site at 234 Rangioru Road is located on generally flat, grassed land in Ōtaki, Kāpiti Coast. The site is currently being used for grazing for livestock and has an access track road running through the west boundary with storage containers located along the eastern periphery of the access track. The site is bounded by residential and lifestyle blocks in each direction with Rangioru Road to the immediate south of site. To the north of site is an unnamed stream with Te Kura-ā-Iwi O Whakatupuranga Rua Mano (School) and Nga Purapura beyond this. Site information and site setting are summarised in Tables 1 and 2, respectively. The site location is presented as Figure 2.

Table 1: Site Information

Item	Description
Location	234 Rangioru Road, Ōtaki
Legal Description	Lot 2 DP 42874
Property Owner	Classic Developments NZ Ltd
Current Land Use	Rural Residential
Proposed Land Use	Residential
Site Area	23,878 m ²
Regional Authority	GWRC and KCDC

Table 2: Site Setting

Item	Description
Topography	The site is generally flat.
Local Setting	The site is located in Ōtaki, to the immediate north of Rangioru Road. The site is bounded by residential and lifestyle blocks in each direction with Rangioru Road to the immediate south of site. To the north of site is an unnamed stream with Te Kura-ā-lwi O Whakatupuranga Rua Mano (School) and Nga Purapura beyond this.
Nearest Surface Water & Use (GWRC GIS)	An unnamed stream, which is classed as a Schedule F1 Waterway, is located approximately 10 m to the north of site. The Ōtaki River is approximately 1100 m to the southwest of the site.
Geology (GNS, 2000)	The site is underlain by Holocene alluvium consisting of well sorted floodplain gravels.
Hydrogeology (GWRC 2014)	There is no known aquifer present beneath the site with the aquifer potential indicated to be poor. Based on previous investigations in the area, depth to groundwater is likely to be approximately 1.3 to 1.9 m.
Groundwater Abstractions (GWRC GIS)	There are no noted groundwater abstractions within 250 m of the site location.
Discharge Consents (GWRC GIS)	There are no noted discharge consents within 250 m of the site location.

3 Previous Site Investigations

No known environmental investigations have been undertaken on the site previously.

4 Site History

ENGEO obtained and reviewed environmental and historical information from a number of sources to investigate the past uses of the site and surrounding areas. Information from these searches, relevant to the site, is summarised in this section.

4.1 GWRC SLUR

Potentially hazardous activities are defined on the Hazardous Activities and Industries List (HAIL). GWRC maintains a SLUR of past and current land uses within the Wellington region, which have had (or are suspected to have had) an activity included on the HAIL identified to have been undertaken on them. The listing of a property on the SLUR triggers the requirement for a contaminated land assessment prior to development if one has not already been undertaken. If a site is not on the SLUR it does not necessarily mean that an activity on the HAIL has not been undertaken, only that it is not known by GWRC to have been undertaken.

The GWRC SLUR was accessed utilising GWRC Web Map Viewer on 29 March 2021 to assess the site and neighbouring sites within 100 m radius. The site is not listed on the SLUR, and no properties listed on the SLUR were identified within 100 m of the site.

4.2 LINZ / KCDC / Archives New Zealand

Available archived records on LINZ, Archives New Zealand's digital resource "Archway" were viewed on 4 May 2021. No relevant files were available.

ENGEO contacted KCDC on 4 May 2021 and received a response on 5 May 2021 that stated they do not hold any files for the site.

4.3 Historical Aerial Photograph Review

Aerial photographs available on Retrolens and Google Earth Pro were viewed on 4 May 2021. The relevant and applicable findings in relation to our investigation are summarised in Table 3.

Table 3: Historical Aerial Photographs

Date	Photographs	Description
1948		The site primarily comprises arable land, potentially utilised as market gardens. There appears to be a structure in the southeast of site.
Retrolens		The surrounding land is primarily undeveloped and used for arable or market garden purposes with Rangioru Road to the immediate south of site. There are residential properties in each direction of the site with a higher density to the northeast, near the centre of the town.
1957		The structure in the southeast of site is no longer present and the field layout has been modified slightly from the previous image. No further changes noted.
Retrolens		Further fields surrounding the site appear to be used as arable land to the northeast and west of site.

Date	Photographs	Description
2006 Google Earth Pro		The site no longer appears to be used for growing crops. The Te Kura-ā-lwi O Whakatapuranga Rua Mano has been constructed to the north of site.
2007 Google Earth Pro		The western site boundary has what appears to be storage containers stored adjacent to the road. A field to the southwest of the site boundary appears to have been stripped.
2015 Google Earth Pro		In the northwest of site, the vegetation appears to have been cleared. It is not obvious what is stored here but could be vehicles, storage containers or structures. What appears to be a storage yard has been constructed to the west of the centre of the western site boundary. Additional development of Te Kura-ā-lwi O Whakatapuranga Rua Mano has been undertaken to the north and Nga Purapura has been constructed to the northeast.

Date	Photographs	Description
2016 Google Earth Pro		In the northwest of site the cleared field appears to have been reseeded, with grass now visible. No further changes noted.

5 Current Site Conditions

Information gathered during ENGEO's site visit on 8 April 2021 is summarised in Table 4.

Table 4: Site Walkover Summary

Site Conditions	Comments
Visible Signs of Contamination	No visible signs of contamination.
Surface Water Appearance	None noted on the site.
Current Surrounding Land Use	The surrounding land use is primarily residential with livestock grazing. See Table 2 for further details.
Local Sensitive Environments	None noted on-site; the Schedule F1 Waterway 10 m to the north is overgrown with vegetation indicating that it is generally slow flowing.
Visible Signs of Plant Stress	None noted.
Ground Cover	There is a gravel access track that runs north along the west site boundary. The remainder of the site is grassed with vegetation and some areas of bare ground noted.
Potential for On or Off-Site Migration of Contaminants	No obvious pathways noted.
Structures Present	There are storage containers noted adjacent to the gravel access track. No further structures noted on-site.

Site Conditions	Comments
Additional Comments	Disturbed ground is noted in an area where previous test pits may have been excavated (Photo 1). Some stockpiles of waste, primarily comprising of wood, are noted in the northwest of site (Photo 2). There is a fuel tank and oil drum noted in a small storage yard to the west of the site boundary (Photos 3 and 4).

Photographs taken during the site walkover are presented in Figure 1.

Figure 1: Site Photographs



Photo 1: Looking west towards the disturbed ground in the northwest of site.



Photo 2: Looking southeast towards one of the stockpiles of waste.



Photo 3: Looking southwest towards the storage yard to the west of site. The fuel container is visible in the foreground with minor staining noted on the ground. This is outside the site boundary.



Photo 4: Looking north along the gravel access track. To the west of site a storage shed is noted with oil drums (red) noted. The shed is outside the site boundary.



Photo 5: Looking south near the centre of the northern site boundary.

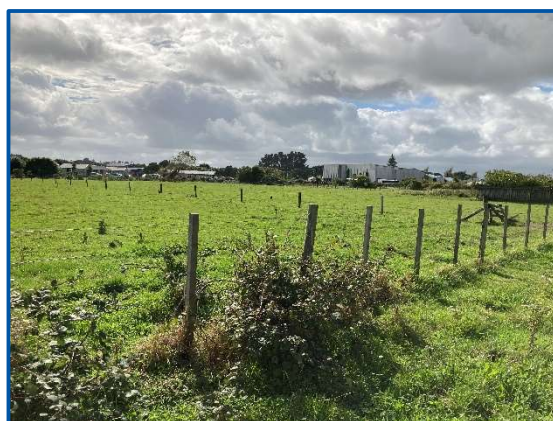


Photo 6: Looking northeast from the southern field.

6 Potential HAIL Activities

Activities included on the MfE Hazardous Activities and Industries List (HAIL) (MfE, 2011b) trigger the requirement for an intrusive detailed environmental site investigation (DSI) prior to redevelopment.

The site is not listed on the GWRC SLUR. Based on the information obtained during the PSI, two HAIL categories have potential to be associated with this site. These HAIL categories and potential contaminants of concern are summarised in Table 5.

Table 5: Summary of Potential HAIL Categories on the Site

Activity	HAIL Category	Description	Contaminants of Concern
Ground disturbance / Undocumented fill	I. Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.	Disturbed ground along the gravel access track and in the northwest field of site.	Asbestos, Heavy metals, Polycyclic Aromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH)
Previous use of the site as arable land / market gardens	A10. Chemical manufacture, application and bulk storage – Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds.	The site was used for many years as arable land / market gardens.	Boron, Heavy metals (with mercury), Organo-Chlorine Pesticides (OCP), PAH, Semi-Volatile Organic Compounds (SVOC)

One off-site HAIL category is / has potential to be associated with this site as summarised in Table 6.

Table 6: Summary of Potential HAIL Categories Surrounding the Site

Activity	HAIL Category	Description	Contaminants of Concern
Storage of fuel tank and drums 5 m to the west of site	A17: Chemical manufacture, application and bulk storage – storage tanks or drums for fuel, chemicals or liquid waste.	A fuel tank and oil drums are stored to the west of the site on the adjacent property.	Benzene, Toluene, Ethylbenzene and Xylene (BTEX), Heavy metals, PAH, TPH

7 Initial Conceptual Site Model

An initial conceptual site model (CSM) has been developed to assess the potential exposure pathways present at the site. A contamination CSM consists of three primary components. For a contaminant to present a risk to human health or an environmental receptor, all three components are required to be present and connected. The three components of a CSM are:

- Source of contamination.
- An exposure route, where the receptor and contaminants come into contact (e.g. ingestion, inhalation, dermal contact).
- Receptor(s) that may be exposed to the contaminants.

The potential source, pathway and receptor linkages at this subject site are provided in Table 7.

Table 7: Initial Conceptual Site Model

Potential Source	Exposure Pathway	Potential Receptor	Acceptable Risk?
Ground disturbance / Undocumented fill <i>Asbestos, Heavy metals, PAH, TPH</i>	Direct contact Ingestion of soil Inhalation of volatile contaminants or windblown dust	Future site users / site redevelopment workers Surrounding residents and environment	No. Risk unknown, further investigation required.
Previous site use as arable / market gardens <i>Boron, Heavy Metals and mercury, OCP, PAH, SVOC</i>			
Storage of fuel to the west of site <i>BTEX, Heavy Metals, PAH, TPH</i>			Yes. Fuel appears to have been stored adequately with only minor localised staining noted. This is unlikely to have impacted the site.

8 Site Investigations

Six soil sampling investigations were conducted as part of this DSI. A test pit investigation was conducted on 15 April 2021 and five hand auger / hand tool investigations were conducted on 11 May 2021, 16 February 2022, 30 March 2022, and 5 and 7 April 2022. The site and test location plan are provided in Figure 2 and Table 8 through Table 11 provide a summary of the soil samples collected. The ground conditions encountered are presented in Table 15.

The site history indicates agricultural use across the site. Based on the approximate area of the investigation site (23,878 m²), MfE guidelines indicate that a recommended number of 30 sample locations is required for soil. A total of 60 soil samples were analysed across the four investigations at 41 locations. Sample locations were chosen to assess side-wide contamination and to target areas where contamination was confirmed.

8.1 Environmental Investigation – 15 April 2021

8.1.1 Investigation Methodology

Test pitting (up to a maximum depth of 2.3 m) was undertaken by Pritchard Civil under the supervision of ENGEO on 15 April 2021. ENGEO collected soil samples for environmental testing from twelve test pits within the top 2.1 m in order to compare test results with current guideline criteria to assess the risk to human health of site workers undertaking the future development works and for future users of the site.

The samples were analysed for a range of analytes, including boron, heavy metals (including mercury), OCP, PAH, Pentachlorophenol (PCP), SVOC, TPH and semi-quantitative asbestos (SQA). A number of samples were tested for pesticides (OCPs and PCP) noting that there is no evidence to suggest that PCP was ever used at the site. Testing was based on visual and olfactory evidence from each sample.

Table 8: Summary of Samples Collected and Requested Analysis – 15 April 2021

Sample ID	Soil Type	Sample Depth (m bgl)	Requested Analyses
TP01 0 – 0.2	Sandy GRAVEL	0 – 0.2	Heavy metals (with mercury), PCP, SQA, TPH
TP01 0.6	SILT	0.6	-
TP02 0 – 0.2	Sandy GRAVEL	0 – 0.2	Heavy metals (with mercury), PAH, SQA, TPH
TP02 0.8	SILT	0.8	SVOC
TP03 0.1	Silty SAND	0.1	Boron, Heavy metals (with mercury), PCP, SQA, TPH
TP03 0.5	SILT	0.5	-

Sample ID	Soil Type	Sample Depth (m bgl)	Requested Analyses
TP04 0.2	Silty SAND	0.2	Heavy metals (with mercury), OCP, PAH
TP04 1.0	SILT	1.0	-
TP05 0.1	Silty SAND	0.1	Heavy metals (with mercury), OCP, PCP
TP06 0.1	Silty SAND	0.1	Heavy metals (with mercury), OCP
TP06 2.0	Silty SAND	2.0	SVOC
TP07 0.1	Silty SAND	0.1	Heavy metals (with mercury), OCP
TP07 2.1	Silty GRAVEL	2.1	Heavy metals
TP08 0.1	Silty SAND	0.1	Boron, Heavy metals (with mercury)
TP08 0.7	SILT	0.7	-
TP09 0.1	Silty SAND	0.1	Heavy metals (with mercury), OCP, PAH, SQA
TP09 1.2	SILT	1.2	Heavy metals (with mercury), SVOC
TP10 0.1	Silty SAND	0.1	Heavy metals (with mercury), OCP
TP11 0.1	Silty SAND	0.1	Boron, Heavy metals (with mercury), OCP
TP12 0.1	Silty SAND	0.1	Heavy metals (with mercury), OCP
TP12 0.4	SILT	0.4	Heavy metals (with mercury)

8.1.2 Sample Methodology

The following methodology was used for taking the soil samples:

- The samples were collected directly from the bucket of the excavator using disposable nitrile gloves. A new pair of disposable nitrile gloves were used for each sample collected and discarded following use.
- Each soil sample was inspected for visual indicators of contamination.
- All soil samples collected during this investigation were placed in jars and plastic containers supplied by RJ Hill Laboratories (Hills) which were then capped. These were labelled with a unique identifier and transported in chilly bins to Hills under standard chain of custody documentation for analysis.
- All fieldwork and sampling was completed in general accordance with the procedures for the appropriate handling of potentially contaminated soils as described in the *MfE Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils* and *BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil (2017)*.

Results from the initial investigation indicated that the soil in some areas had been impacted by previous uses. Arsenic, in two locations (TP01 and TP04), exceeded the human health criteria for residential use. The arsenic result of the sample taken at TP09 was the same as the human health criteria for residential use.

8.2 Environmental Investigation – 11 May 2021

8.2.1 Investigation Methodology

During the initial investigation, arsenic was detected in exceedance of human health criteria at TP01, TP04, and TP09. A second investigation was conducted on 11 May 2021 to target and delineate the extents of the arsenic contamination. Eleven sample locations were selected around the previous sample locations TP01, TP04 and TP09 in a grid formation.

The test location plan is provided in Appendix 1 and Table 9 provides a summary of the soil samples collected.

Table 9: Additional Sampling Summary of Samples Collected and Requested Analysis

Sample ID	Soil Type	Sample Depth (m bgl)	Requested Analyses
TP01 A	Silty SAND	0 – 0.2	Heavy metals (with mercury)
TP01 B			
TP01 C			
TP01 D			
TP01 E			
TP04 A			
TP04 B			
TP04 C			
TP04 D			
TP09 A			
TP09 B			

8.2.2 Sample Methodology

Sampling was undertaken in accordance with Section 8.1.2 with the following exceptions:

- The samples were collected directly from each location using a spade and / or trowel.
- After the collection of each sample, the sampling equipment was decontaminated by washing with a solution of Decon90 followed by deionised water.

8.3 Environmental Investigation – 16 February 2022

8.3.1 Investigation Methodology

Additional delineation sampling was conducted near TP01 on 16 February 2022. The test location plan is provided in Figure 2 and Table 10 provides a summary of the soil samples collected.

8.3.2 Sample Methodology

Sampling was undertaken in accordance with Section 8.2.2.

Table 10: Summary of Samples Collected and Requested Analysis – 16 February 2022

Sample ID	Soil Type	Sample Depth (m bgl)	Requested Analyses
ASA	Sandy SILT (topsoil)	0.0-0.1	Arsenic
ASB	Sandy SILT (topsoil)	0.0-0.1	Arsenic
ASC	Sandy SILT (topsoil)	0.0-0.1	Arsenic
ASD	Sandy SILT (topsoil)	0.0-0.1	Arsenic

8.4 Environmental Investigations – March & April 2022

8.4.1 Investigation Methodology

An additional site-wide investigation was conducted on 30 March, 5 April, and 7 April 2022 following a request from GWRC to increase the number of sample locations site-wide.

8.4.2 Sample Methodology

Sampling was undertaken in accordance with Section 8.2.2.

Table 11: Summary of Samples Collected and Requested Analysis – March & April 2022

Sample ID	Soil Type	Sample Depth (m bgl)	Requested Analyses
PS01	Sandy SILT (topsoil)	0.0-0.1	Heavy metals, asbestos
PS02	Sandy SILT (topsoil)	0.0-0.1	Heavy metals, OCPs, asbestos
PS03	Sandy SILT (topsoil)	0.0-0.1	Heavy metals, PAHs, TPH, asbestos
PS03a	SILT	0.3-0.5	Heavy metals, PAHs, TPH, asbestos
PS04	Sandy SILT (topsoil)	0.0-0.1	Heavy metals w/ mercury, boron, SVOCs
PS04a	SILT	0.3-0.5	Heavy metals w/ mercury, boron, SVOCs
PS05	Sandy SILT (topsoil)	0.0-0.1	Heavy metals w/ mercury, boron, SVOCs

Sample ID	Soil Type	Sample Depth (m bgl)	Requested Analyses
PS06	Sandy SILT (topsoil)	0.0-0.1	Heavy metals, PAHs, TPH, asbestos
PS06a	SILT	0.3-0.5	Heavy metals, PAHs, TPH, asbestos
PS07	Sandy SILT (topsoil)	0.0-0.1	Heavy metals w/ mercury, boron, SVOCs
PS08	Sandy SILT (topsoil)	0.0-0.1	Heavy metals w/ mercury, boron, SVOCs
PS08a	SILT	0.2-0.3	Heavy metals w/ mercury, boron, SVOCs
PS09	Sandy SILT (topsoil)	0.0-0.1	Heavy metals w/ mercury, boron, SVOCs
PS10	Sandy SILT (topsoil)	0.0-0.1	Heavy metals w/ mercury, boron, SVOCs
PS10a	SILT	0.2-0.3	Heavy metals w/ mercury, boron, SVOCs
PS11	Sandy SILT (topsoil)	0.0-0.1	Heavy metals w/ mercury, boron, SVOCs
PS12	Sandy SILT (topsoil)	0.0-0.1	Heavy metals w/ mercury, boron, SVOCs
PS12a	SILT	0.2-0.3	Heavy metals w/ mercury, boron, SVOCs
PS13	Sandy SILT (topsoil)	0.0-0.1	Heavy metals w/ mercury, boron, SVOCs
PS13a	SILT	0.3-0.5	Heavy metals w/ mercury, boron, SVOCs
PS14	Sandy SILT (topsoil)	0.0-0.1	Heavy metals w/ mercury, boron, SVOCs
PS15	Sandy SILT (topsoil)	0.0-0.1	Heavy metals (QA/QC duplicate sample)
PS16	Sandy SILT (topsoil)	0.0-0.1	Heavy metals, PAH, and TPH (QA/QC duplicate sample)

Sample ID	Soil Type	Sample Depth (m bgl)	Requested Analyses
PS17	Sandy SILT	0.0-0.1	Heavy metals, PAH, and TPH (QA/QC duplicate sample)

In accordance with MfE guidance, field duplicates were taken in order to provide information on the overall variability or precision of both the sampling technique and the analytical laboratory testing.

A field duplicate involves the collection of two separate (replicate) samples from a single sample location, storing in two separate containers and submitting as two separate samples for laboratory analysis.

Three field duplicate samples were collected:

- PS15 is a duplicate of PS01;
- PS16 is a duplicate of PS06; and
- PS17 is a duplicate of PS03.

8.5 Environmental Investigation – 26 May 2022

8.5.1 Investigation Methodology

Additional delineation sampling was conducted near PS14 on 26 May 2022. The test location plan is provided in Figure 2 and Table 12 provides a summary of the soil samples collected.

8.5.2 Sample Methodology

Sampling was undertaken in accordance with Section 8.2.2.

Table 12: Summary of Samples Collected and Requested Analysis – 26 May 2022

Sample ID	Soil Type	Sample Depth (m bgl)	Requested Analyses
GA	Sandy SILT (topsoil)	0.0-0.1	Arsenic
GB	Sandy SILT (topsoil)	0.0-0.1	Arsenic
GC	Sandy SILT (topsoil)	0.0-0.1	Arsenic
GD	Sandy SILT (topsoil)	0.0-0.1	Arsenic

8.6 Quality Assurance and Quality Control

The quality assurance / quality control (QA / QC) procedures employed during the works included:

- The use of standard sample registers and chain of custody records / Hills app for all samples collected.
- Each soil sample was given a unique identification number.

Hills are an International Accreditation New Zealand (IANZ) laboratory for the analyses performed. To maintain their IANZ accreditation, Hills undertake rigorous cross checking and routine duplicate sample testing to ensure the accuracy of their results.

- Asbestos in soil samples analysed by Hills are undertaken in accordance with AS4964-2004: *Method for the Qualitative Identification of Asbestos in Bulk Samples* for the analysis of suspected asbestos in soil samples, and to international standard NZS ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories* in accordance with The Building Research Association New Zealand (BRANZ) New Zealand Guidelines for Assessing and Managing Asbestos in Soil, 2017.
- During the site investigation, every attempt was made to ensure that cross contamination did not occur through the use of procedures outlined in this document.

9 Regulatory Framework and Assessment Criteria

The regulatory framework and rules relating to the management and control of contaminated sites in the Wellington Region are specified in two documents: the NES and the GWRC Regional Plan. A summary of each and its implications for the site is provided in the sections below. Values relating to these stated criteria can be found in Appendix 1.

9.1 NES

Soil Contaminant Standards

The NES came into effect on 1 January 2012 (MfE, 2011). The NES introduced soil contaminant standards (SCSs) for 12 priority contaminants for the protection of human health under a variety of land use scenarios.

The NES requires the *Contaminated Land Management Guidelines No.2: Hierarchy and Application in New Zealand of Environmental Guideline Values* be used where a NES SCS is not available.

The NES does not consider environmental receptors; accordingly, the application of guidelines relevant to environmental receptors shall be implemented according to the MfE CLMG No.2 and any relevant rules in the Regional Plan.

In addition, local background levels in soil have been referenced to establish consenting implications under the NES and disposal requirements. Background levels for contaminants in soils in the area were obtained from the URS document – Determination of Common Pollutant Background Soil Concentrations for the Wellington Region (URS, 2003).

Relevant criteria have been outlined with laboratory result summary tables for both Human Health and Regional Background. Human health criteria screening for residential 10% produce use and commercial / industrial outdoor worker (unpaved) use have been undertaken based on the future use of the site and also the short-term works involved in construction and installation of services.

Disturbing Soil

Soil disturbance on sites with potentially contaminated soils are covered by the NES.

If the limits of soil disturbance or soil disturbance or soil removal exceed the permitted activity criteria, then a resource consent will be required for the works. The permitted activity criteria are given in Regulation 8(3) of the NES and are as follows:

“Disturbing the soil of the piece of land is a permitted activity while the following requirements are met:

- (a) controls to minimise the exposure of humans to mobilised contaminants must –*
 - (i) be in place when the activity begins:*
 - (ii) be effective while the activity is done:*
 - (iii) be effective until the soil is reinstated to an erosion-resistant state:*
- (b) the soil must be reinstated to an erosion-resistant state within 1 month after the serving of the purpose for which the activity was done:*
- (c) the volume of the disturbance of the soil of the piece of land must be no more than 25 m³ per 500 m²:*
- (d) soil must not be taken away in the course of the activity, except that, -*
 - (i) for the purpose of laboratory analysis, any amount of soil may be taken away as samples:*
 - (ii) for all other purposes combined, a maximum of 5 m³ per 500 m² of soil may be taken away per year:*
- (e) soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind:*
- (f) the duration of the activity must be no longer than 2 months:*
- (g) the integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.”*

9.2 Greater Wellington Regional Council Regional Plan

Under the GWRC Proposed Natural Resources Plan (Greater Wellington Regional Council, 2021), Rule R55 potentially applies to the site.

Rule R55: Discharges from contaminated land – permitted activity

The discharge of a contaminant from contaminated land where a contaminant may enter water is a permitted activity provided the following conditions are met:

(a) a detailed site investigation has been undertaken, reported and provided to Wellington Regional Council in accordance with Rule R54, and

(b) the results of the detailed site investigation indicates that the discharge does not pose unacceptable risks to human health or the environment – on-site or off-site, or

(c) the discharge from SLUR Category III land or SLUR Category IV land does not, or is not likely to, result in:

(i) water quality exceeding the maximum acceptable value (MAV) in the Drinking-Water Standards New Zealand 2005 (Revised 2008) or 50% of the MAV in a community drinking water supply protection area shown on Maps 26, 27a, 27b or 27c at the following locations:

1. at the property boundary, or within 50m from the source of the discharge, whichever is the lesser distance, or

2. in an existing bore within the property boundary or within 50m from the source of the discharge, whichever is the lesser distance, used to abstract water for any use other than water quality monitoring,

(ii) water quality in a surface water body within the property boundary or within 50m from the source of the discharge, whichever is the lesser distance, exceeding a value in Schedule W for the protection of 95% of species.

9.3 Asbestos Criteria

The fieldwork and reporting for this site have been undertaken in general accordance with The Building Research Association New Zealand (BRANZ) New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ, 2017) (herein referred to as 'The BRANZ Guideline'). The BRANZ Guidelines have been developed based on the WA DOH Guidelines but with the New Zealand regulatory environment in mind.

The BRANZ guideline criteria have been adopted as investigation criteria for this assessment and are presented in Table 13.

Table 13: Adopted Asbestos Investigation Criteria

Form of Asbestos		Soil guideline values for asbestos (w/w)			
		Residential ¹	High-density residential ²	Recreational ³	Commercial and Industrial ⁴
ACM (bonded)		0.01%	0.04%	0.02%	0.05%
FA and / or AF ⁵		0.001%			
All forms of asbestos – surface		No visible asbestos on surface soil ⁶			
Capping requirements for residual contamination above selected soil guideline value					
Depth ⁷	Hard cap	No depth limitation, no controls – except for long-term management			
	Soft cap	≥0.5 m			≥0.2 m

Notes: ACM: “Any material or item that, by its design, contains asbestos (typically comprising bonded cement board). The concentration of ACM in soil can either be quantified using an IANZ accredited laboratory or in the field using less-reliable field techniques.”

FA: “Fibrous asbestos, as per WA Guidelines, is “friable asbestos material, such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products”. FA can be detected visually, but to quantify the concentration of FA in soil, an accredited laboratory should be used.”

AF: “Asbestos fines. Includes free fibres of asbestos, fibrous asbestos, small fibre bundles and also ACM fragments that pass through a 7 x 7 mm sieve for field screening and 10 x 10 mm sieve in the laboratory. The measurement of AF in soil is completed by an IANZ accredited laboratory.”

1. Residential: Single dwelling site with garden and / or accessible soil. Also includes daycare centres, preschools, primary and secondary schools and rural residential.”

2. High-density residential: Urban residential site with limited exposed soil / soil contact, including small gardens. Applicable to urban townhouses, flats and ground-floor apartments with small ornamental gardens but not high-rise apartments (with very low opportunity for soil contact).

3. Recreational: Public and private green areas and sports and recreation reserves. Includes playing fields, suburban reserves where children play frequently and school playing fields.

4. Commercial and industrial: Includes accessible soils within retail, office, factory and industrial sites. Many commercial and industrial properties are well paved with concrete pavement and buildings that will adequately cover / cap any contaminated soils.

5. FA and / or AF: Where free fibre is present at concentrations at or below 0.001% w/w, a proportion of these samples should be analysed using the laboratory analysis method described in section 5.4.4” of the BRANZ Guideline “(≥10% of samples). This is due to limitations in the AS 4964-2004 and WA Guidelines 500 ml sample method for free fibre (see section 5.4” of the BRANZ guideline “for more information).

6. Surface: Effective options include raking / tilling the top 100 mm of asbestos-contaminated soil (or to clean soil / fill if shallower to avoid contaminating clean material at depth) and hand picking to remove visible asbestos and ACM fragments or covering with a soft cap of virgin natural material (VNM) 100 mm thick delineated by a permeable geotextile marker layer or hard cap. Near-surface fragments of ACM can become exposed in soft soils such as sandy pumiceous soils after periods of rain.

7. Depth: Capping is used where contamination levels exceed soil guideline values. Considerations of depth need to incorporate the type and likelihood of future disturbance activities at the site and site capping requirements (see section 6.1” of the BRANZ guideline). “Ideally, any capping layer should be delineated by a permeable geotextile marker layer between the cap and underlying asbestos / contaminated material. Institutional controls must be used to manage long-term risks, particularly where the cap may be disturbed (see section 7” of the BRANZ guideline). “Two forms of capping are typically used:
a. Hard cap comprises surfaces that are difficult to penetrate and isolate the asbestos contamination, such as tar seal or concrete driveway cover. This would typically not include pavers or decking due to maintenance and coverage factors.
b. Soft cap consists of a layer(s) of material which either comprise virgin natural material or soils that meet the asbestos residential soil guideline value from an on-site source. Use of on-site soils may require resource consent.”

9.4 Regulatory Requirements

The BRANZ Asbestos in Soil Guidelines (2017) introduce varying controls commensurate with the risk level based on the amount of asbestos identified in soil, and if applicable, air. Table 14 summarises the BRANZ Guideline site classification and controls recommended. As the BRANZ Guideline is referenced in the WorkSafe approved code of practice (ACOP), the Guideline or a higher level of controls are required to be adhered to.

Table 14: Asbestos Related Controls

Controls	Proposed Earthwork Situation			
	Class A	Class B	Asbestos-Related Work	Unlicensed Asbestos Work
Licensed Removal Contractor				
Asbestos in air	≥ 0.01 f/mL in air	≥ 0.01 f/mL in air	< 0.01 f/mL in air	< 0.01 f/mL in air
FA/AF % w/w in soil	> 1	> 0.01	> 0.001	≤ 0.001
ACM % w/w	-	> 1	> 0.01	≤ 0.01
Scale, soil volume	-	-	$> \text{NES-CS}$	$\leq \text{NES-CS}$

NOTE: NES-CS – Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

9.5 Assessment Criteria

Contaminant concentrations in soil were compared to human health criteria based on the residential 10% produce land use and commercial / industrial outdoor worker (unpaved) use.

The land use scenarios for residential 10% produce are relevant to the likely future use of the site as a residential subdivision and commercial / industrial outdoor worker (unpaved) land use are being used as a surrogate to assess short-term risks to on site workers during construction works / installation of services / development etc.

The NES methodology document notes that the exposure parameters assumed for the maintenance / excavation scenario in other New Zealand guidelines are unrealistic (perhaps by a factor of 10 or more). The technical committee preparing the NES decided that a maintenance / excavation worker scenario should not be included in the NES as sites would not be cleaned up to this standard. It was considered more appropriate that exposure to these workers be limited through the use of site-specific controls that are required under health and safety legislation. However, this report uses commercial / industrial outdoor worker criteria to get a general sense of potential risks to excavation workers during the works.

Note that commercial / industrial outdoor worker criteria are based on personnel carrying out activities involving soil exposure to surface soil, for example during landscaping activities and occasional shallow excavation for routine underground service maintenance. Exposure to soil is less intensive than would occur during installation works but occurs over a longer period.

For a construction worker developing the site, the soil exposure is limited when compared to a large earthworks project (e.g. for a residential subdivision or industrial development).

As such, the commercial / industrial outdoor worker criteria are considered suitable for obtaining a high-level understanding of potential risks to excavation workers during site redevelopment and confirming the need for site controls.

The soil analysis results have been compared to MfE guidelines, National Environmental Protection Measures (NEPM), NES SCSs and Regional Background levels for boron, heavy metals, OCP, PAH, PCP, SVOC, and TPH and the BRANZ Guidance criteria for asbestos.

9.6 Disposal Criteria

An assessment of potential off-site disposal options for materials generated during site remediation works has been conducted. Dependent on the contamination conditions of the materials, off-site disposal options range from disposal to “cleanfill” sites to licensed Class A and B landfills.

As outlined in the publication “Technical Guidelines for Disposal to Land” (WAMINZ, 2016) cleanfill is:

“Virgin excavated natural materials (VENM) such as clay, soil and rock that are free of:

- *Combustible, putrescible, degradable or leachable components;*
- *Hazardous substances or materials (such as municipal solid waste) likely to create leachate by means of biological breakdown;*
- *Products or materials derived from hazardous waste treatment, stabilisation or disposal practices;*
- *Materials such as medical and veterinary waste, asbestos or radioactive substances that may present a risk to human health if excavated;*
- *Contaminated soil and other contaminated materials; and*
- *Liquid waste.*

When discharged to the environment, cleanfill material will not have a detectable effect relative to the background.”

10 Results

10.1 Ground Conditions Encountered

A summary of the ground conditions encountered in the test pits is provided in Table 15. Full test pit logs are provided in Appendix 3.

Table 15: Summary of Ground Conditions

Unit	Description	Typical Depth to top of layer (m)	Typical Depth to bottom of layer (m)
Fill*	Silty SAND	0.0	0.4
	Sandy GRAVEL	0.0	0.4
Topsoil	Silty SAND	0.0	0.3
Alluvium	SILT	0.2	1.8
	Sandy SILT	1.2	NP
	Clayey SILT	1.2	1.9
	Silty gravelly SAND	1.3	NP
	Silty sandy GRAVEL	1.2	NP

NP = Not proven. * = TP01-TP04 only. The fill comprises mainly reworked silty sand with some gravel and minor fragments of glass and ceramics.

10.2 Environmental Investigation

Soil analytical results and the relevant adopted assessment criteria are presented in Appendix 1. Certified laboratory reports are included in Appendix 2. Boron and PCP results have not been included in the tables in Appendix 1 as all results were below levels of detection (LOD). OCP, SVOCs, PAH and TPH results have not been included as there are no exceedances of human health criteria or landfill acceptance criteria. Asbestos results have not been included as there was none detected.

The analytical results can be summarised as follows:

Human Health Criteria

- Two exceedances of arsenic are noted for human health criteria residential 10% produce in TP01 (58 mg/kg) and TP04 (26 mg/kg) from samples of fill. One result was noted to equal the human health criteria for residential 10% produce in TP09 at 0.1 m (20 mg/kg).
- Four exceedances of arsenic are noted for human health criteria residential 10% produce in TP01 A (48 mg/kg), C (27 mg/kg), D (60 mg/kg) and E (49 mg/kg) from the fill.
- Two exceedances of arsenic are noted for human health criteria residential 10% produce in ASA (32 mg/kg) and ASD (32 mg/kg) in the topsoil.
- Two exceedances of arsenic are noted for human health criteria residential 10% produce in PS06 (21 mg/kg) and PS14 (26 mg/kg) in the topsoil. An exceedance of arsenic was also noted in PS16 (21 mg/kg), which is a duplicate of PS06. The exceedance of arsenic at PS06 (and duplicate PS16) is marginal and, when averaged with the concentrations of samples collected outside of the remedial areas (Figure 2), it is considered unlikely to be a risk.

- No exceedances for boron, heavy metals (with the exception of arsenic), OCP, PAH, PCP, SVOC or TPH were recorded in soil above human health criteria.

Regional Background Criteria

- Exceedances of the Wellington region background criteria were noted in the majority of samples for arsenic, cadmium, chromium, copper, mercury, nickel, and zinc.
- Exceedances of regional background concentrations were recorded for anthracene, benzo[a]pyrene, fluoranthene, naphthalene, phenanthrene and pyrene. PAH concentrations were not detected above the LOD, but were still reported as exceeding the regional background criteria because the laboratory LOD is higher than the regional background criteria.
- The LOD for boron is above the regional background criteria.
- No exceedances were recorded for TPH.
- No regional background criteria exist for OCP, PCP and SVOC.

Landfill Acceptance Criteria

- Copper exceeded landfill Class A disposal criteria in TP01 D.
- Zinc exceeded landfill Class A disposal criteria in PS02.
- No exceedances for landfill Class A disposal criteria were noted for boron, PAH or OCP.
- No landfill Class A criteria exist for PCP, SVOC or TPH.

Asbestos

- Asbestos was not detected in any samples analysed.

10.3 Duplicate Information

As part of the sampling programme, duplicate samples were collected during the investigation to identify the potential for cross contamination while sampling at the site.

The following duplicate samples were taken, with the relative percentage difference (RPD) calculated to identify if the difference is acceptable. An acceptable percentage difference is less than 30-50%. The RPD is calculated by:

$$\text{Relative percent difference} = \frac{(\text{Result No.1} - \text{Result No.2}) \times 100}{\text{Mean Result}}$$

A total of six samples were collected for duplicate analysis. The duplicate samples were analysed for heavy metals, PAH and TPH. Samples from these locations returned results below the laboratory limits of detection (LOD) for PAHs and therefore, only heavy metal and TPH values were compared. All laboratory analysis results, including the duplicates, are presented in Appendix 2. The RPD assessment is included as Appendix 4.

As the RPD's for the selected duplicate samples returned percentages below the accepted values, the sample methods and QA/QC procedures used are considered acceptable. The data quality objectives of the investigation have been met and the laboratory results are therefore considered to be suitable for basing conclusions on.

11 Updated Conceptual Site Model

The initial CSM presented in Section 7 has been updated based on the laboratory analysis results and is presented in Table 16.

Table 16: Updated Conceptual Site Model

Potential Source	Exposure Pathway	Potential Receptor	Acceptable Risk?
Ground disturbance / Undocumented fill <i>Asbestos, Heavy metals, PAH, TPH</i>	Direct contact Ingestion of soil Inhalation of volatile contaminants or windblown dust	Future site users / site redevelopment workers Surrounding residents and environment	No In total, ten exceedances of arsenic were noted for the residential with 10% produce human health criteria. Soil remediation is required.
Previous site use as arable / market gardens <i>Boron, Heavy metals (with mercury), OCP, PAH, PCP, SVOC</i>			

12 Conclusions and Recommendations

ENGEO Ltd was requested by Classic Developments NZ Ltd to undertake a combined PSI / DSI at 234 Rangioru Road, the location of a proposed subdivision in Ōtaki.

Assessment of the information collected as part of this investigation identified two HAIL categories that apply to this site:

- **HAIL ID A10:** Chemical manufacture, application and bulk storage – persistent pesticide bulk storage or use including sports turfs, market gardens, orchards, glass houses or spray sheds.
- **HAIL ID I:** Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

Six soil sampling events were conducted as part of this DSI. A test pit investigation was conducted on 15 April 2021 and hand auger / hand tool investigations were conducted on 11 May 2021, 16 February 2022, 30 March 2022, 5 and 7 April 2022, and 26 May 2022.

The site history indicates agricultural use across the site. Based on the approximate area of the investigation site (23,878 m²), MfE guidelines indicate that a recommended number of 30 sample locations is required for soil. A total of six soil samples were analysed across the six investigations.

Sample locations were chosen to assess potential site-wide contamination and to target areas where contamination had been confirmed. The samples were analysed for a range of analytes including boron, heavy metals including mercury, OCP, PAH, PCP, SQA, SVOC and TPH and asbestos.

There were no exceedances of boron, heavy metals, OCPs, PAH, PCP, SVOC, TPH, or asbestos over the previously agricultural site area. Based on these results and the desk based section of the work it is likely that the risk of unidentified hotspots of contamination is likely to be low and this risk can be managed adequately through the unexpected contamination procedures in a Site Management Plan (SMP).

Arsenic was detected in exceedance of residential 10% produce human health criteria in ten locations. The exceedances were restricted to the first 0.2 m bgs, which included top soil or fill. Given the site history and that no exceedances were recorded for material collected from the natural silt layer, it is not likely that the natural silt beneath the topsoil or fill is impacted.

Due to the exceedances of arsenic for the residential with 10% produce human health criteria, soil remediation is required. Based on the results of the testing to date, the areas where remediation is required are shown on Figure 1. These areas may be reduced in size by additional testing, or by on-site testing during remediation. Prior to any earthworks being undertaken, a Remedial Action Plan (RAP) is required to manage the potential impact to the future site users and the surrounding population / environment.

Should any soil require disposing off-site during the redevelopment works, the results indicate that this is suitable for disposal to Class A landfill with the exception of an exceedance of copper in TP01 D. TCLP analysis is recommended to determine whether the materials from this area are suitable for acceptance at a Class A landfill.

Based on the results, a consent would be required under the NES for soil disturbance and subdivision. Other Regional Council consents may also be required for the works and this should be confirmed with the Council.

13 References

Google Maps & Google Earth Pro

GWRC website (<http://mapping.gw.govt.nz/>)

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Retrolens Historical Image Resource (<http://retrolens.nz/>)

14 Limitations

- i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Classic Developments NZ Ltd, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.
- ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.
- iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.
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We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (04) 472 0820 if you require any further information.

Report prepared by



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Environmental Scientist

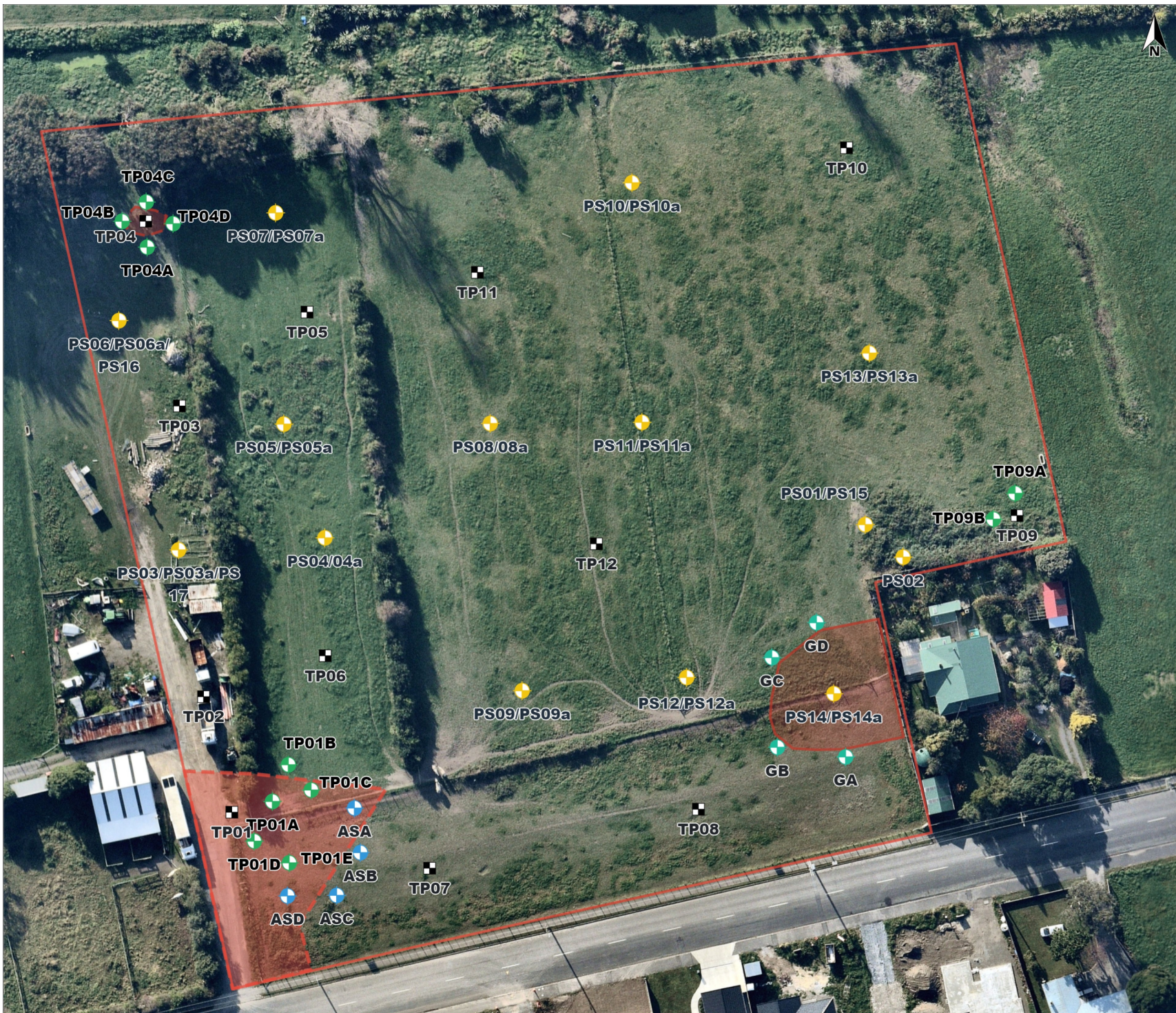
Report reviewed by



Dave Robotham, CEnvP SC

Principal Environmental Consultant

FIGURES



Legend

- Test Pit Location - 15 April 2021
- Sample Location - 11 May 2021
- Sample Location - 16 February 2022
- Sample Location - March & April 2022
- Sample Location - 26 May 2022
- Site Boundary
- Remediation Area

0 10 m 20 m
© Nearmaps

ENGEO
Produced by Datanest.earth

Title: Test and Sample Location Plan		
Client: Classic Developments NZ Ltd		
Project: 234 Rangiru Road	Drawn: CM	Figure No: 2
Date: 15-04-2021	Checked: N/A	Size: A4
Proj No: 18634.000.001	Scale: 1:964	Version: 1

APPENDIX 1:

Summary of Laboratory Analysis

Table 1: Soil Chemical Contaminant Concentrations (Heavy metals) Compared to Assessment Criteria– 15 April 2021

Sample ID	TP01	TP02	TP03	TP04	TP05	TP06	TP07	TP08	TP09	TP10	TP11	TP12	Human health Criteria	Human health Criteria	Landfill Class A Disposal Criteria	Regional background for Wellington Region – Main Soil Type 1 (Sand)			
Sample Date	15 April 2021												Commercial Outdoor worker (unpaved)	Residential 10% Produce					
Sample Depth (m)	0-0.2	0-0.2	0.1	0.2	0.1	0.1	0.1	2.1	0.1	0.1	1.2	0.1					0.1	0.1	0.4
Arsenic (mg/kg)	58	15	18	26	18	12	9	2	9	20	3	19	10	10	10	70 (B)	20 (B)	100	<2 - 7
Cadmium (mg/kg)	0.41	0.24	0.14	0.18	0.12	0.14	0.14	<0.1	0.23	0.27	<0.1	0.24	0.15	0.17	0.37	1,300 (B)	3 (B)	20	<0.1 - 0.1
Chromium (mg/kg)	18	18	16	19	17	17	18	16	19	18	16	21	19	17	18	6,300 (B)	460 (B)	100	7 - 12
Copper (mg/kg)	77	36	24	42	36	30	48	13	60	50	11	31	33	40	40	10,000 (B)	10,000 (B)	100	4 - 10
Lead (mg/kg)	106	41	32	35	31	26	26	14.9	29	33	18.9	32	29	27	30	3,300 (B)	210 (B)	100	4.5 – 180
Mercury (mg/kg)	0.93	0.26	0.13	0.16	0.18	0.14	0.13	0.13	0.11	0.13	0.14	0.20	0.17	0.16	0.21	4,200 (B)	310 (B)	4	<0.1 – 0.1
Nickel (mg/kg)	17	16	14	18	18	16	16	17	17	16	15	19	18	16	17	6,000 (D)	400 (D)	200	4 - 9
Zinc (mg/kg)	141	121	103	100	98	82	93	68	96	117	62	99	91	84	88	400,000 (D)	7,400 (D)	200	28 - 79

General Notes: This table does not represent the full analytical results; please refer to the laboratory results for full details. Values in bold exceed the adopted background concentrations. Values in italics exceed human health criteria for commercial outdoor worker (unpaved). Values underlined exceed human health criteria for residential 10% produce.

Guideline Notes:

B - Methodology for Deriving Soil Guideline Values Protective of Human Health (NES, 2011)

D - National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 2013)

Table 2: Soil Chemical Contaminant Concentration (Heavy metals) Compared to Assessment Criteria – 11 May 2021

Sample ID	TP01 A	TP01 B	TP01 C	TP01 D	TP01 E	TP04 A	TP04 B	TP04 C	TP04 D	TP09 A	TP09 B	Human health Criteria	Human health Criteria	Landfill Class A Disposal Criteria	Regional background for Wellington Region – Main Soil Type 1 (Sand)
Sample Date	11 May 2021											Commercial Outdoor worker (unpaved)	Residential 10% Produce		
Sample Depth (m)	0-0.2														
Arsenic (mg/kg)	<u>48</u>	16	<u>27</u>	<u>60</u>	<u>49</u>	16	14	19	18	19	18	70 (B)	20 (B)	100	<2 - 7
Cadmium (mg/kg)	0.23	0.21	0.18	0.26	0.25	0.17	0.13	0.17	0.16	0.33	0.24	1,300 (B)	3 (B)	20	<0.1 - 0.1
Chromium (mg/kg)	16	17	16	16	16	15	16	18	15	16	15	6,300 (B)	460 (B)	100	7 - 12
Copper (mg/kg)	38	44	55	194	77	28	32	36	32	46	44	10,000 (B)	10,000 (B)	100	4 - 10
Lead (mg/kg)	35	33	34	47	34	34	38	46	28	32	29	3,300 (B)	210 (B)	100	4.5 – 180
Mercury (mg/kg)	0.13	0.26	0.19	0.31	0.13	0.14	0.12	< 0.1	0.14	0.12	0.11	4,200 (B)	310 (B)	4	<0.1 – 0.1
Nickel (mg/kg)	15	16	16	15	16	15	15	16	14	15	15	6,000 (D)	400 (D)	200	4 - 9
Zinc (mg/kg)	111	105	98	128	108	91	101	115	89	119	109	400,000 (D)	7,400 (D)	200	28 - 79

General Notes: This table does not represent the full analytical results; please refer to the laboratory results for full details. Values in bold exceed the adopted background concentrations. Values underlined exceed human health criteria for residential 10% produce. Values in italics exceed Class A landfill disposal criteria. Guideline Notes: B - Methodology for Deriving Soil Guideline Values Protective of Human Health (NES, 2011) D - National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 2013)

Table 3: Soil Chemical Contaminant Concentration (Heavy metals) Compared to Assessment Criteria – 16 February 2022

Sample ID	ASA	ASB	ASC	ASD	Human health Criteria Commercial Outdoor worker (unpaved)	Human health Criteria Residential 10% Produce	Landfill Class A Disposal Criteria	Regional background for Wellington Region – Main Soil Type 1 (Sand)
Sample Date	16 February 2022							
Sample Depth (m)	0.0-0.1							
Arsenic (mg/kg)	<u>32</u>	11	13	<u>32</u>	70 (B)	20 (B)	100	<2 - 7

General Notes: This table does not represent the full analytical results; please refer to the laboratory results for full details. Values in bold exceed the adopted background concentrations. Values underlined exceed human health criteria for residential 10% produce. Values in italics exceed Class A landfill disposal criteria. Guideline Notes: B - Methodology for Deriving Soil Guideline Values Protective of Human Health (NES, 2011)D - National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 2013)

Table 4: Soil Chemical Contaminant Concentration (Heavy metals) Compared to Assessment Criteria – March & April 022																												
Sample ID	PS01	PS02	PS03	PS03a	PS04	PS04a	PS05	PS06	PS06a	PS07	PS08	PS08a	PS09	PS10	PS10a	PS11	PS12	PS12a	PS13	PS13a	PS14	PS15	PS16	PS17	Human health Criteria	Human health Criteria	Landfill Class A Disposal Criteria	Regional background for Wellington Region – Main Soil Type 1 (Sand)
Sample Date	30 March 2021										5 April 2022								30 March 2022		5 April 2022	7 April 2022			Commercial Outdoor worker (unpaved)	Residential 10% Produce		
Sample Depth (m)	0.0-0.1	0.0-0.1	0.0-0.1	0.3-0.5	0.0-0.1	0.3-0.5	0.0-0.1	0.0-0.1	0.3-0.5	0.0-0.1	0.0-0.1	0.2-0.3	0.0-0.1	0.0-0.1	0.2-0.3	0.0-0.1	0.0-0.1	0.2-0.3	0.0-0.1	0.3-0.5	0.0-0.1	0.0-0.1	0.0-0.1					
Arsenic (mg/kg)	17	19	19	15	11	8	11	21	11	16	9	10	9	10	12	11	12	12	15	10	26	17	21	20	70 (B)	20 (B)	100	<2 - 7
Cadmium (mg/kg)	0.49	0.56	< 0.3	< 0.1	0.16	< 0.1	0.15	0.2	< 0.1	0.14	0.16	0.18	0.2	0.23	0.22	0.17	0.17	0.17	0.5	0.19	0.17	0.49	0.19	0.19	1,300 (B)	3 (B)	20	<0.1 - 0.1
Chromium (mg/kg)	16	18	16	19	19	18	19	18	19	17	18	18	18	18	18	18	19	16	17	18	18	16	16	15	6,300 (B)	460 (B)	100	7 - 12
Copper (mg/kg)	40	30	35	24	52	32	50	43	21	37	36	36	46	52	52	47	47	49	36	20	59	42	45	40	10,000 (B)	10,000 (B)	100	4 - 10
Lead (mg/kg)	49	89	28	28	27	27	29	47	30	32	27	27	27	27	28	26	25	27	25	27	35	50	40	30	3,300 (B)	210 (B)	100	4.5 – 180
Mercury (mg/kg)	-	-	-	-	0.18	0.17	0.17	-	-	0.13	0.12	0.13	0.11	0.17	0.14	0.15	0.15	0.16	< 0.3	0.17	0.16	-	-	-	4,200 (B)	310 (B)	4	<0.1 – 0.1
Nickel (mg/kg)	15	14	14	17	16	17	17	16	17	15	17	16	16	16	16	17	17	17	15	18	17	16	17	17	6,000 (D)	400 (D)	200	4 - 9
Zinc (mg/kg)	111	310	99	84	88	86	93	93	80	88	89	87	91	88	91	96	91	90	82	80	103	116	103	123	400,000 (D)	7,400 (D)	200	28 - 79
General Notes: This table does not represent the full analytical results; please refer to the laboratory results for full details. Values in bold exceed the adopted background concentrations. Values underlined exceed human health criteria for residential 10% produce. Values highlighted grey exceed Class A landfill disposal criteria. Guideline Notes: B - Methodology for Deriving Soil Guideline Values Protective of Human Health (NES, 2011)D - National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 2013)																												

Table 5: Soil Chemical Contaminant Concentration (Heavy metals) Compared to Assessment Criteria – 26 May 2022

Sample ID	GA	GB	GC	GD	Human health Criteria Commercial Outdoor worker (unpaved)	Human health Criteria Residential 10% Produce	Landfill Class A Disposal Criteria	Regional background for Wellington Region – Main Soil Type 1 (Sand)
Sample Date	26 May 2022							
Sample Depth (m)	0.0-0.1							
Arsenic (mg/kg)	8	9	10	10	70 (B)	20 (B)	100	<2 - 7

General Notes: This table does not represent the full analytical results; please refer to the laboratory results for full details. Values in bold exceed the adopted background concentrations. Values underlined exceed human health criteria for residential 10% produce. Values in italics exceed Class A landfill disposal criteria. Guideline Notes: B - Methodology for Deriving Soil Guideline Values Protective of Human Health (NES, 2011)D - National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 2013)

APPENDIX 2: Laboratory Reports



Certificate of Analysis

Page 1 of 5

Client:	Engeo Limited	Lab No:	2945740	SPV1
Contact:	Karen Jones	Date Received:	05-Apr-2022	
	C/- Engeo Limited	Date Reported:	12-Apr-2022	
	PO Box 25047	Quote No:	82742	
	Wellington 6146	Order No:		
		Client Reference:	234 Rangioru	
		Submitted By:	Calum MacRae	

Sample Type: Soil

Sample Name:	PS08 05-Apr-2022	PS08a 05-Apr-2022	PS09 05-Apr-2022	PS10 05-Apr-2022	PS10a 05-Apr-2022
Lab Number:	2945740.1	2945740.2	2945740.3	2945740.5	2945740.6

Individual Tests

Dry Matter	g/100g as rcvd	77	78	77	79	80
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20

Heavy Metals with Mercury, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	9	10	9	10	12
Total Recoverable Cadmium	mg/kg dry wt	0.16	0.18	0.20	0.23	0.22
Total Recoverable Chromium	mg/kg dry wt	18	18	18	18	18
Total Recoverable Copper	mg/kg dry wt	36	36	46	52	52
Total Recoverable Lead	mg/kg dry wt	27	27	27	27	28
Total Recoverable Mercury	mg/kg dry wt	0.12	0.13	0.11	0.17	0.14
Total Recoverable Nickel	mg/kg dry wt	17	16	16	16	16
Total Recoverable Zinc	mg/kg dry wt	89	87	91	88	91

Haloethers in SVOC Soil Samples by GC-MS

Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Nitrogen containing compounds in SVOC Soil Samples by GC-MS

2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8

Organochlorine Pesticides in SVOC Soil Samples by GC-MS

Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	< 2	< 2
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Endrin	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		PS08 05-Apr-2022	PS08a 05-Apr-2022	PS09 05-Apr-2022	PS10 05-Apr-2022	PS10a 05-Apr-2022
Lab Number:		2945740.1	2945740.2	2945740.3	2945740.5	2945740.6
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	< 3
2-Methylphenol (o-cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	< 30
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	< 5	< 5
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
1,3-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
1,4-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Hexachlorobutadiene	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Hexachloroethane	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Sample Type: Soil						
Sample Name:		PS08 05-Apr-2022	PS08a 05-Apr-2022	PS09 05-Apr-2022	PS10 05-Apr-2022	PS10a 05-Apr-2022
Lab Number:		2945740.1	2945740.2	2945740.3	2945740.5	2945740.6
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	< 10	< 10
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sample Name:		PS11 05-Apr-2022	PS12 05-Apr-2022	PS12a 05-Apr-2022	PS14 05-Apr-2022	
Lab Number:		2945740.7	2945740.9	2945740.10	2945740.11	
Individual Tests						
Dry Matter	g/100g as rcvd	77	75	78	76	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	11	12	12	26	-
Total Recoverable Cadmium	mg/kg dry wt	0.17	0.17	0.17	0.17	-
Total Recoverable Chromium	mg/kg dry wt	18	19	16	18	-
Total Recoverable Copper	mg/kg dry wt	47	47	49	59	-
Total Recoverable Lead	mg/kg dry wt	26	25	27	35	-
Total Recoverable Mercury	mg/kg dry wt	0.15	0.15	0.16	0.16	-
Total Recoverable Nickel	mg/kg dry wt	17	17	17	17	-
Total Recoverable Zinc	mg/kg dry wt	96	91	90	103	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Endosulfan II	mg/kg dry wt	< 2	< 2	< 2	< 2	-
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Endrin	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-

Sample Type: Soil						
Sample Name:		PS11 05-Apr-2022	PS12 05-Apr-2022	PS12a 05-Apr-2022	PS14 05-Apr-2022	
Lab Number:		2945740.7	2945740.9	2945740.10	2945740.11	
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Chrysene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Fluorene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Pyrene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	< 1.3	< 1.3	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	< 5	< 5	-
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	< 3	< 3	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	< 3	< 3	< 3	< 3	-
2-Methylphenol (o-cresol)	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2-Nitrophenol	mg/kg dry wt	< 5	< 5	< 5	< 5	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	< 30	< 30	-
Phenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	< 5	< 5	-
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	< 1.0	< 1.0	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
Hexachlorobutadiene	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
Hexachloroethane	mg/kg dry wt	< 0.8	< 0.8	< 0.8	< 0.8	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	< 10	< 10	-
Carbazole	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-
Isophorone	mg/kg dry wt	< 0.5	< 0.5	< 0.5	< 0.5	-

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-3, 5-7, 9-11
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-3, 5-7, 9-11
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 30 mg/kg dry wt	1-3, 5-7, 9-11
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-3, 5-7, 9-11
Total Recoverable Boron	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	20 mg/kg dry wt	1-3, 5-7, 9-11

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 08-Apr-2022 and 12-Apr-2022. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Kim Harrison MSc
Client Services Manager - Environmental



Certificate of Analysis

Page 1 of 3

Client:	Engeo Limited	Lab No:	2948732	SPV1
Contact:	Karen Jones	Date Received:	07-Apr-2022	
	C/- Engeo Limited	Date Reported:	14-Apr-2022	
	PO Box 25047	Quote No:	82742	
	Wellington 6146	Order No:		
		Client Reference:	234 RANGIURU	
		Submitted By:	Calum MacRae	

Sample Type: Soil

Sample Name:	PS15	PS16	PS17		
	07-Apr-2022	07-Apr-2022	07-Apr-2022		
Lab Number:	2948732.1	2948732.2	2948732.3		

Individual Tests

Dry Matter	g/100g as rcvd	-	77	70	-	-
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Heavy Metals, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	17	21	20	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.49	0.19	0.19	-	-
Total Recoverable Chromium	mg/kg dry wt	16	16	15	-	-
Total Recoverable Copper	mg/kg dry wt	42	45	40	-	-
Total Recoverable Lead	mg/kg dry wt	50	40	30	-	-
Total Recoverable Nickel	mg/kg dry wt	16	17	17	-	-
Total Recoverable Zinc	mg/kg dry wt	116	103	123	-	-

Polycyclic Aromatic Hydrocarbons Screening in Soil*

Total of Reported PAHs in Soil	mg/kg dry wt	-	< 0.4	< 0.4	-	-
1-Methylnaphthalene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
2-Methylnaphthalene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Acenaphthylene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Acenaphthene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Anthracene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Benzo[a]anthracene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	< 0.04	< 0.04	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	< 0.04	< 0.04	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Benzo[e]pyrene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Chrysene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Fluoranthene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Fluorene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Naphthalene	mg/kg dry wt	-	< 0.07	< 0.07	-	-
Perylene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Phenanthrene	mg/kg dry wt	-	< 0.013	< 0.014	-	-
Pyrene	mg/kg dry wt	-	< 0.013	< 0.014	-	-



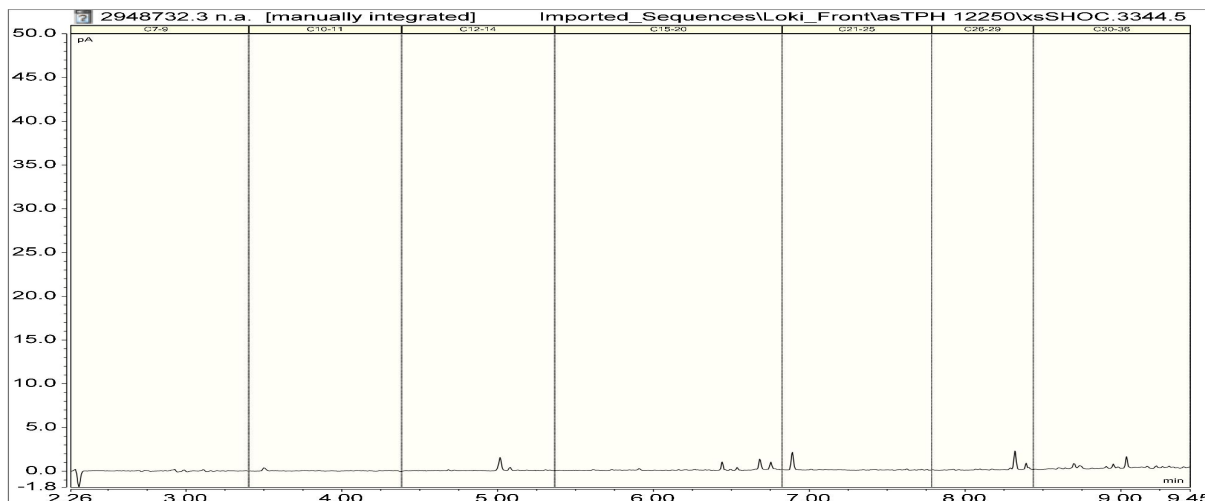
This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		PS15 07-Apr-2022	PS16 07-Apr-2022	PS17 07-Apr-2022		
Lab Number:		2948732.1	2948732.2	2948732.3		
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	< 20	< 20	-	-
C10 - C14	mg/kg dry wt	-	< 20	< 20	-	-
C15 - C36	mg/kg dry wt	-	< 40	48	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	< 80	< 80	-	-

2948732.3

PS17 07-Apr-2022

Client Chromatogram for TPH by FID



Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-3
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	2-3
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	2-3
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	2-3
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	2-3
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	2-3
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-3

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	3
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	2-3
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	2-3
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	2-3
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	2-3

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 13-Apr-2022 and 14-Apr-2022. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Kim Harrison MSc
Client Services Manager - Environmental



Certificate of Analysis

Page 1 of 1

Client:	Engeo Limited	Lab No:	2999342	SPv1
Contact:	Gabriela Staehle	Date Received:	26-May-2022	
	C/- Engeo Limited	Date Reported:	01-Jun-2022	
	PO Box 25047	Quote No:	82742	
	Wellington 6146	Order No:		
		Client Reference:		
		Submitted By:	Calum MacRae	

Sample Type: Soil

	Sample Name:	GA 26-May-2022	GB 26-May-2022	GC 26-May-2022	GD 26-May-2022	
	Lab Number:	2999342.1	2999342.2	2999342.3	2999342.4	
Total Recoverable Arsenic	mg/kg dry wt	8	9	10	10	-

Analyst's Comments

Appendix No.1 - Chain of Custody

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-4
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%.	-	1-4
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-4
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-4

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed on 01-Jun-2022. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Graham Corban MSc Tech (Hons)
Client Services Manager - Environmental



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Quote No

Primary Contact

Submitted By GS/CMClient Name ENGED

Address

Postcode

Phone

Mobile

Email

Charge To ENGED

Client Reference

Order No

Results To

Reports will be emailed to Primary Contact by default.
Additional Reports will be sent as specified below.

☒ Email Primary Contact ☐ Email Submitter ☐ Email Client

☐ Email Other

☐ Other

ADDITIONAL INFORMATION

- All sample material soil
- All sample dates 26/05
- All samples held & cold

ANALYSIS REQUEST

R J Hill Laboratories Limited
3/204 Thorndon Quay
Pipitea
Wellington 6011
New Zealand

Job No: Date Recv: 26-May-22 16:10

299 9342

Received by: Kelsey Rohloff

3129993422

16.5°C

CHAIN OF CUSTODY RECORD

Sent to

Hill Laboratories

Date & Time:

Name:

☐ Tick if you require COC
to be emailed back

Signature:

Samples will be processed at a Hill Laboratories site with the appropriate testing capability and capacity. Please inform the Laboratory if you wish samples to be retained and analysed at the site of receipt.

Received at

Hill Laboratories

Date & Time:

Name:

Signature:

Priority

☐ Low

☒ Normal

☐ High

☐ Urgent (ASAP extra charge applies, please contact lab first)

Requested Reporting Date: _____

Please ensure all asbestos samples are individually double bagged upon submission to the laboratory.

No.	Sample Name	Sample Material	Sample Location	Sample Date	Tests Required (if not as per Quote)
1	G A				
2	G B				
3	G C				
4	G D				
5	G E				
6	G P				
7	G G				
8	G H				
9					
10					



Certificate of Analysis

Page 1 of 3

Client:	Engeo Limited	Lab No:	2586321	A2Pv1
Contact:	Roz Cox C/- Engeo Limited PO Box 25047 Wellington 6146	Date Received:	16-Apr-2021	
		Date Reported:	20-Apr-2021	
		Quote No:	82742	
		Order No:		
		Client Reference:	18634.000.001	
		Add. Client Ref:	Sampled: 15/04/21	
		Submitted By:	Calum MacRae	

Sample Type: Soil

Sample Name:	TP01 0-0.2 15-Apr-2021	TP02 0-0.2 15-Apr-2021	TP03 0.1 15-Apr-2021	TP09 0.1 15-Apr-2021	
Lab Number:	2586321.1	2586321.2	2586321.3	2586321.4	
Asbestos Presence / Absence	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	-
Description of Asbestos Form	-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	% w/w < 0.001	-
As Received Weight	g 936.4	g 977.0	g 764.4	g 841.4	-
Dry Weight	g 811.6	g 862.5	g 566.4	g 693.0	-
Moisture	% 13	% 12	% 26	% 18	-
Sample Fraction >10mm*	g dry wt 75.7	g dry wt 154.4	g dry wt 34.2	g dry wt < 0.1	-
Sample Fraction <10mm to >2mm*	g dry wt 361.8	g dry wt 250.7	g dry wt 123.6	g dry wt 72.4	-
Sample Fraction <2mm*	g dry wt 374.1	g dry wt 456.9	g dry wt 408.7	g dry wt 621.2	-
<2mm Subsample Weight*	g dry wt 51.3	g dry wt 50.2	g dry wt 52.8	g dry wt 51.2	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	-
Weight of Asbestos as Fibrous Asbestos (Friable)*	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001	-



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Glossary of Terms

- Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
- Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
- ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
- ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
- Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
- Trace - Trace levels of asbestos, as defined by AS4964-2004.

For further details, please contact the Asbestos Team.

Please refer to the **BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil**.

<https://www.branz.co.nz/asbestos>

The following assumptions have been made:

1. Asbestos Fines in the <2mm fraction, after homogenisation, is evenly distributed throughout the fraction
2. The weight of asbestos in the sample is unaffected by the ashing process.

Results are representative of the sample provided to Hill Laboratories only.

Analyst's Comments

Appendix No.1 - Chain of Custody

Summary of Methods

The following table(s) give a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-4
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-4
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-4
Sample Fraction >10mm*	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-4
Sample Fraction <10mm to >2mm*	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-4
Sample Fraction <2mm*	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-4
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-4
Description of Asbestos Form	Description of asbestos form and/or shape if present. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	-	1-4
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-4
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4
Weight of Asbestos as Fibrous Asbestos (Friable)*	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-4
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-4

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-4

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed on 20-Apr-2021. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Keith Benson HNC Chem
Laboratory Technician - Asbestos



Quote No

Primary Contact · Roz Cox

Submitted By Calum MacRae

Client Name ENGEO

Address Level 18 Plimmer Towers, 2-6 Gilmer Terrace

Postcode 6011

Phone

Mobile

Email

Charge To 18634.000.001

Client Reference

Order No

Results To Reports will be emailed to Primary Contact by default.
Additional Reports will be sent as specified below.

☒ Email Primary Contact ☒ Email Submitter ☐ Email Client
☐ Email Other☐ Other

ADDITIONAL INFORMATION

SQA = Semi-Quantitative Asbestos, H&C = Hold & Cold

ANALYSIS REQUEST

R J Hill Laboratories Limited
28 Duke Street, Hamilton 3204
Private Bag 3205
Hamilton 3240, New Zealand

Job No:

Date Recv: 16-Apr-21 09:13

258 6321

T 0508 HILL LAB (44 555 22)

T +64 7 858 2000

E mail@hill-labs.co.nz

W www.hill-laboratories.com

Received by: Kelsey Rohloff



3125863219

CHAIN OF CUSTODY RECORD

Sent to

Hill Laboratories

Date & Time:

Name:

☐ Tick if you require COC
to be emailed back

Signature:

Received at

Hill Laboratories

Date & Time:

Name:

Signature:

Condition

☐ Room Temp☐ Chilled☐ Frozen

Temp:

8.3°C

☐ Sample and Analysis details checked

Signature:

Priority

☐ Low☒ Normal☐ High
☐ Urgent (ASAP, extra charge applies, please contact lab first)

Requested Reporting Date:

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	TP01 0-0.2	15/04/21	-	SOIL	SQA, heavy metals, TPH, PCP
2	TP01 0.6	15/04/21	-	SOIL	H&C
3	TP02 0-0.2	15/04/21	-	SOIL	SQA, heavy metals, TPH, PAH
4	TP02 0.8	15/04/21	-	SOIL	SVOC
5	TP03 0.1	15/04/21	-	SOIL	heavy metals, TPH, boron, PCP, SQA
6	TP03 0.5	15/04/21	-	SOIL	H&C
7	TP04 0.2	15/04/21	-	SOIL	heavy metals, PAH, OCP
8	TP04 1.0	15/04/21	-	SOIL	H&C
9	TP05 0.1	15/04/21	-	SOIL	heavy metals, PCP
10	TP06 0.1	15/04/21	-	SOIL	OCP
11	TP06 2.0	15/04/21	-	SOIL	SVOC
12	TP07 0.1	15/04/21	-	SOIL	OCP

Continued on next page

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
13	TP07 2.1	15/04/21	-	SOIL	heavy metals
14	TP08 0.1	15/04/21	-	SOIL	boron
15	TP08 0.7	15/04/21	-	SOIL	H&C
16	TP09 0.1	15/04/21	-	SOIL	SQA, heavy metals, PAH, SVOC
17	TP09 1.2	15/04/21	-	SOIL	heavy metals, SVOC
18	TP10 0.1	15/04/21	-	SOIL	heavy metals
19	TP11 0.1	15/04/21	-	SOIL	boron
20	TP12 0.1	15/04/21	-	SOIL	OCP
21	TP12 0.4	15/04/21	-	SOIL	heavy metals
22					
23	ADD 1 MORE SQA				
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					



Certificate of Analysis

Page 1 of 12

Client:	Engeo Limited	Lab No:	2586323	SPv3
Contact:	Roz Cox	Date Received:	16-Apr-2021	
	C/- Engeo Limited	Date Reported:	14-May-2021	(Amended)
	PO Box 25047	Quote No:	82742	
	Wellington 6146	Order No:	18634.000.001	
		Client Reference:	18634.000.001	
		Submitted By:	Calum MacRae	

Sample Type: Soil

Sample Name:		TP01 0-0.2 15-Apr-2021	TP02 0-0.2 15-Apr-2021	TP02 0.8 15-Apr-2021	TP03 0.1 15-Apr-2021	TP04 0.2 15-Apr-2021
Lab Number:		2586323.1	2586323.3	2586323.4	2586323.5	2586323.7
Individual Tests						
Dry Matter	g/100g as rcvd	86	84	78	72	80
Total Recoverable Boron	mg/kg dry wt	-	-	-	< 20	-
Total Recoverable Mercury	mg/kg dry wt	0.93	0.26	-	0.13	0.16
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	58	15	-	18	26
Total Recoverable Cadmium	mg/kg dry wt	0.41	0.24	-	0.14	0.18
Total Recoverable Chromium	mg/kg dry wt	18	18	-	16	19
Total Recoverable Copper	mg/kg dry wt	77	36	-	24	42
Total Recoverable Lead	mg/kg dry wt	106	41	-	32	35
Total Recoverable Nickel	mg/kg dry wt	17	16	-	14	18
Total Recoverable Zinc	mg/kg dry wt	141	121	-	103	100
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	-	-	-	< 0.013
alpha-BHC	mg/kg dry wt	-	-	-	-	< 0.013
beta-BHC	mg/kg dry wt	-	-	-	-	< 0.013
delta-BHC	mg/kg dry wt	-	-	-	-	< 0.013
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	-	< 0.013
cis-Chlordane	mg/kg dry wt	-	-	-	-	< 0.013
trans-Chlordane	mg/kg dry wt	-	-	-	-	< 0.013
2,4'-DDD	mg/kg dry wt	-	-	-	-	< 0.013
4,4'-DDD	mg/kg dry wt	-	-	-	-	< 0.013
2,4'-DDE	mg/kg dry wt	-	-	-	-	< 0.013
4,4'-DDE	mg/kg dry wt	-	-	-	-	0.021
2,4'-DDT	mg/kg dry wt	-	-	-	-	< 0.013
4,4'-DDT	mg/kg dry wt	-	-	-	-	< 0.013
Total DDT Isomers	mg/kg dry wt	-	-	-	-	< 0.08
Dieldrin	mg/kg dry wt	-	-	-	-	< 0.013
Endosulfan I	mg/kg dry wt	-	-	-	-	< 0.013
Endosulfan II	mg/kg dry wt	-	-	-	-	< 0.013
Endosulfan sulphate	mg/kg dry wt	-	-	-	-	< 0.013
Endrin	mg/kg dry wt	-	-	-	-	< 0.013
Endrin aldehyde	mg/kg dry wt	-	-	-	-	< 0.013
Endrin ketone	mg/kg dry wt	-	-	-	-	< 0.013
Heptachlor	mg/kg dry wt	-	-	-	-	< 0.013
Heptachlor epoxide	mg/kg dry wt	-	-	-	-	< 0.013
Hexachlorobenzene	mg/kg dry wt	-	-	-	-	< 0.013
Methoxychlor	mg/kg dry wt	-	-	-	-	< 0.013



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		TP01 0-0.2 15-Apr-2021	TP02 0-0.2 15-Apr-2021	TP02 0.8 15-Apr-2021	TP03 0.1 15-Apr-2021	TP04 0.2 15-Apr-2021
Lab Number:		2586323.1	2586323.3	2586323.4	2586323.5	2586323.7
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	0.6	-	-	< 0.3
1-Methylnaphthalene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
2-Methylnaphthalene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Acenaphthylene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Acenaphthene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Anthracene	mg/kg dry wt	-	0.022	-	-	< 0.013
Benzo[a]anthracene	mg/kg dry wt	-	0.056	-	-	< 0.013
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	0.037	-	-	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	0.06	-	-	< 0.03
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	0.06	-	-	< 0.03
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	0.048	-	-	< 0.013
Benzo[e]pyrene	mg/kg dry wt	-	0.024	-	-	< 0.013
Benzo[g,h,i]perylene	mg/kg dry wt	-	0.027	-	-	< 0.013
Benzo[k]fluoranthene	mg/kg dry wt	-	0.020	-	-	< 0.013
Chrysene	mg/kg dry wt	-	0.047	-	-	< 0.013
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Fluoranthene	mg/kg dry wt	-	0.095	-	-	< 0.013
Fluorene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	0.027	-	-	< 0.013
Naphthalene	mg/kg dry wt	-	< 0.06	-	-	< 0.07
Perylene	mg/kg dry wt	-	< 0.012	-	-	< 0.013
Phenanthrene	mg/kg dry wt	-	0.081	-	-	< 0.013
Pyrene	mg/kg dry wt	-	0.096	-	-	< 0.013
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	-	-	< 0.05	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	-	-	< 0.05	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	< 0.4	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	< 0.5	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
2,6-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
Nitrobenzene	mg/kg dry wt	-	-	< 0.5	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	< 0.8	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	< 0.8	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	< 0.5	-	-
alpha-BHC	mg/kg dry wt	-	-	< 0.5	-	-
beta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
delta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDD	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDE	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDT	mg/kg dry wt	-	-	< 1.0	-	-
Dieldrin	mg/kg dry wt	-	-	< 0.5	-	-
Endosulfan I	mg/kg dry wt	-	-	< 1.0	-	-
Endosulfan II	mg/kg dry wt	-	-	< 2	-	-
Endosulfan sulphate	mg/kg dry wt	-	-	< 1.0	-	-
Endrin	mg/kg dry wt	-	-	< 0.8	-	-

Sample Type: Soil						
Sample Name:		TP01 0-0.2 15-Apr-2021	TP02 0-0.2 15-Apr-2021	TP02 0.8 15-Apr-2021	TP03 0.1 15-Apr-2021	TP04 0.2 15-Apr-2021
Lab Number:		2586323.1	2586323.3	2586323.4	2586323.5	2586323.7
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Endrin ketone	mg/kg dry wt	-	-	< 1.0	-	-
Heptachlor	mg/kg dry wt	-	-	< 0.5	-	-
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.5	-	-
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	-	< 0.5	-	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.5	-	-
Anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
1&2-Chloronaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Chrysene	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Fluorene	mg/kg dry wt	-	-	< 0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.5	-	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Naphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Phenanthrene	mg/kg dry wt	-	-	< 0.5	-	-
Pyrene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 1.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 1.3	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	< 5	-	-
2-Chlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dimethylphenol	mg/kg dry wt	-	-	< 3	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	-	-	< 3	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	< 1.0	-	-
2-Nitrophenol	mg/kg dry wt	-	-	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	< 30	-	-
Phenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	< 5	-	-
Butylbenzylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	< 1.0	-	-
Diethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Dimethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-butylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-octylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,3-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,4-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachlorobutadiene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachloroethane	mg/kg dry wt	-	-	< 0.8	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-

Sample Type: Soil						
Sample Name:		TP01 0-0.2 15-Apr-2021	TP02 0-0.2 15-Apr-2021	TP02 0.8 15-Apr-2021	TP03 0.1 15-Apr-2021	TP04 0.2 15-Apr-2021
Lab Number:		2586323.1	2586323.3	2586323.4	2586323.5	2586323.7
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	< 10	-	-
Carbazole	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzofuran	mg/kg dry wt	-	-	< 0.5	-	-
Isophorone	mg/kg dry wt	-	-	< 0.5	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	-	< 9	-
C10 - C14	mg/kg dry wt	< 20	< 20	-	< 20	-
C15 - C36	mg/kg dry wt	127	< 40	-	< 40	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	131	< 70	-	< 70	-
Sample Name:		TP05 0.1 15-Apr-2021	TP06 0.1 15-Apr-2021	TP06 2.0 15-Apr-2021	TP07 0.1 15-Apr-2021	TP07 2.1 15-Apr-2021
Lab Number:		2586323.9	2586323.10	2586323.11	2586323.12	2586323.13
Individual Tests						
Dry Matter	g/100g as rcvd	79	80	83	82	-
Total Recoverable Mercury	mg/kg dry wt	0.18	-	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	18	-	-	-	2
Total Recoverable Cadmium	mg/kg dry wt	0.12	-	-	-	< 0.10
Total Recoverable Chromium	mg/kg dry wt	17	-	-	-	16
Total Recoverable Copper	mg/kg dry wt	36	-	-	-	13
Total Recoverable Lead	mg/kg dry wt	31	-	-	-	14.9
Total Recoverable Nickel	mg/kg dry wt	18	-	-	-	17
Total Recoverable Zinc	mg/kg dry wt	98	-	-	-	68
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	12	-	8	-
Total Recoverable Cadmium	mg/kg dry wt	-	0.14	-	0.19	-
Total Recoverable Chromium	mg/kg dry wt	-	17	-	18	-
Total Recoverable Copper	mg/kg dry wt	-	30	-	48	-
Total Recoverable Lead	mg/kg dry wt	-	26	-	26	-
Total Recoverable Mercury	mg/kg dry wt	-	0.14	-	0.13	-
Total Recoverable Nickel	mg/kg dry wt	-	16	-	16	-
Total Recoverable Zinc	mg/kg dry wt	-	82	-	93	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
alpha-BHC	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
beta-BHC	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
delta-BHC	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
cis-Chlordane	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
trans-Chlordane	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
2,4'-DDD	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
4,4'-DDD	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
2,4'-DDE	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
4,4'-DDE	mg/kg dry wt	0.028	0.060	-	0.102	-
2,4'-DDT	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
4,4'-DDT	mg/kg dry wt	0.025	0.040	-	0.057	-
Total DDT Isomers	mg/kg dry wt	< 0.08	0.10	-	0.16	-
Dieldrin	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Endosulfan I	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Endosulfan II	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Endosulfan sulphate	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Endrin	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Endrin aldehyde	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Endrin ketone	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Heptachlor	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-

Sample Type: Soil						
Sample Name:		TP05 0.1 15-Apr-2021	TP06 0.1 15-Apr-2021	TP06 2.0 15-Apr-2021	TP07 0.1 15-Apr-2021	TP07 2.1 15-Apr-2021
Lab Number:		2586323.9	2586323.10	2586323.11	2586323.12	2586323.13
Organochlorine Pesticides Screening in Soil						
Heptachlor epoxide	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Hexachlorobenzene	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Methoxychlor	mg/kg dry wt	< 0.013	< 0.013	-	< 0.012	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	< 0.05	-	-	-	-
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	< 0.05	-	-	-	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	< 0.4	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	< 0.5	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
2,6-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
Nitrobenzene	mg/kg dry wt	-	-	< 0.5	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	< 0.8	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	< 0.8	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	< 0.5	-	-
alpha-BHC	mg/kg dry wt	-	-	< 0.5	-	-
beta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
delta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDD	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDE	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDT	mg/kg dry wt	-	-	< 1.0	-	-
Dieldrin	mg/kg dry wt	-	-	< 0.5	-	-
Endosulfan I	mg/kg dry wt	-	-	< 1.0	-	-
Endosulfan II	mg/kg dry wt	-	-	< 2	-	-
Endosulfan sulphate	mg/kg dry wt	-	-	< 1.0	-	-
Endrin	mg/kg dry wt	-	-	< 0.8	-	-
Endrin ketone	mg/kg dry wt	-	-	< 1.0	-	-
Heptachlor	mg/kg dry wt	-	-	< 0.5	-	-
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.5	-	-
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	-	< 0.5	-	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.5	-	-
Anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
1&2-Chloronaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Chrysene	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Fluorene	mg/kg dry wt	-	-	< 0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.5	-	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Naphthalene	mg/kg dry wt	-	-	< 0.5	-	-

Sample Type: Soil						
Sample Name:		TP05 0.1 15-Apr-2021	TP06 0.1 15-Apr-2021	TP06 2.0 15-Apr-2021	TP07 0.1 15-Apr-2021	TP07 2.1 15-Apr-2021
Lab Number:		2586323.9	2586323.10	2586323.11	2586323.12	2586323.13
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Phenanthrene	mg/kg dry wt	-	-	< 0.5	-	-
Pyrene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 1.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 1.3	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	< 5	-	-
2-Chlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dimethylphenol	mg/kg dry wt	-	-	< 3	-	-
3 & 4-Methylphenol (m- + p- cresol)	mg/kg dry wt	-	-	< 3	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	< 1.0	-	-
2-Nitrophenol	mg/kg dry wt	-	-	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	< 30	-	-
Phenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	< 5	-	-
Butylbenzylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	< 1.0	-	-
Diethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Dimethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-butylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-octylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,3-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,4-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachlorobutadiene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachloroethane	mg/kg dry wt	-	-	< 0.8	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	< 10	-	-
Carbazole	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzofuran	mg/kg dry wt	-	-	< 0.5	-	-
Isophorone	mg/kg dry wt	-	-	< 0.5	-	-
Sample Name:		TP08 0.1 15-Apr-2021	TP09 0.1 15-Apr-2021	TP09 1.2 15-Apr-2021	TP10 0.1 15-Apr-2021	TP11 0.1 15-Apr-2021
Lab Number:		2586323.14	2586323.16	2586323.17	2586323.18	2586323.19
Individual Tests						
Dry Matter	g/100g as rcvd	-	79	89	84	77
Total Recoverable Boron	mg/kg dry wt	< 20	-	-	-	< 20
Total Recoverable Mercury	mg/kg dry wt	-	0.13	0.14	0.20	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	20	3	19	-
Total Recoverable Cadmium	mg/kg dry wt	-	0.27	< 0.10	0.24	-
Total Recoverable Chromium	mg/kg dry wt	-	18	16	21	-
Total Recoverable Copper	mg/kg dry wt	-	50	11	31	-
Total Recoverable Lead	mg/kg dry wt	-	33	18.9	32	-
Total Recoverable Nickel	mg/kg dry wt	-	16	15	19	-
Total Recoverable Zinc	mg/kg dry wt	-	117	62	99	-

Sample Type: Soil						
Sample Name:		TP08 0.1 15-Apr-2021	TP09 0.1 15-Apr-2021	TP09 1.2 15-Apr-2021	TP10 0.1 15-Apr-2021	TP11 0.1 15-Apr-2021
Lab Number:		2586323.14	2586323.16	2586323.17	2586323.18	2586323.19
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	9	-	-	-	10
Total Recoverable Cadmium	mg/kg dry wt	0.23	-	-	-	0.15
Total Recoverable Chromium	mg/kg dry wt	19	-	-	-	19
Total Recoverable Copper	mg/kg dry wt	60	-	-	-	33
Total Recoverable Lead	mg/kg dry wt	29	-	-	-	29
Total Recoverable Mercury	mg/kg dry wt	0.11	-	-	-	0.17
Total Recoverable Nickel	mg/kg dry wt	17	-	-	-	18
Total Recoverable Zinc	mg/kg dry wt	96	-	-	-	91
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
alpha-BHC	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
beta-BHC	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
delta-BHC	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
gamma-BHC (Lindane)	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
cis-Chlordane	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
trans-Chlordane	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
2,4'-DDD	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
4,4'-DDD	mg/kg dry wt	-	0.014	-	< 0.012	< 0.013
2,4'-DDE	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
4,4'-DDE	mg/kg dry wt	-	0.061	-	0.024	0.019
2,4'-DDT	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
4,4'-DDT	mg/kg dry wt	-	0.035	-	0.027	0.013
Total DDT Isomers	mg/kg dry wt	-	0.11	-	< 0.07	< 0.08
Dieldrin	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Endosulfan I	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Endosulfan II	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Endosulfan sulphate	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Endrin	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Endrin aldehyde	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Endrin ketone	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Heptachlor	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Heptachlor epoxide	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Hexachlorobenzene	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Methoxychlor	mg/kg dry wt	-	< 0.013	-	< 0.012	< 0.013
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	< 0.4	-	-	-
1-Methylnaphthalene	mg/kg dry wt	-	< 0.013	-	-	-
2-Methylnaphthalene	mg/kg dry wt	-	< 0.013	-	-	-
Acenaphthylene	mg/kg dry wt	-	< 0.013	-	-	-
Acenaphthene	mg/kg dry wt	-	< 0.013	-	-	-
Anthracene	mg/kg dry wt	-	< 0.013	-	-	-
Benzo[a]anthracene	mg/kg dry wt	-	< 0.013	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	< 0.013	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	< 0.04	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	< 0.04	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	< 0.013	-	-	-
Benzo[e]pyrene	mg/kg dry wt	-	< 0.013	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	< 0.013	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	< 0.013	-	-	-
Chrysene	mg/kg dry wt	-	< 0.013	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	< 0.013	-	-	-
Fluoranthene	mg/kg dry wt	-	< 0.013	-	-	-
Fluorene	mg/kg dry wt	-	< 0.013	-	-	-

Sample Type: Soil						
Sample Name:		TP08 0.1 15-Apr-2021	TP09 0.1 15-Apr-2021	TP09 1.2 15-Apr-2021	TP10 0.1 15-Apr-2021	TP11 0.1 15-Apr-2021
Lab Number:		2586323.14	2586323.16	2586323.17	2586323.18	2586323.19
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	< 0.013	-	-	-
Naphthalene	mg/kg dry wt	-	< 0.07	-	-	-
Perylene	mg/kg dry wt	-	< 0.013	-	-	-
Phenanthrene	mg/kg dry wt	-	< 0.013	-	-	-
Pyrene	mg/kg dry wt	-	< 0.013	-	-	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	< 0.4	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	< 0.5	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
2,6-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
Nitrobenzene	mg/kg dry wt	-	-	< 0.5	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	< 0.7	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	< 0.7	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	< 0.5	-	-
alpha-BHC	mg/kg dry wt	-	-	< 0.5	-	-
beta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
delta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDD	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDE	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDT	mg/kg dry wt	-	-	< 1.0	-	-
Dieldrin	mg/kg dry wt	-	-	< 0.5	-	-
Endosulfan I	mg/kg dry wt	-	-	< 1.0	-	-
Endosulfan II	mg/kg dry wt	-	-	< 2	-	-
Endosulfan sulphate	mg/kg dry wt	-	-	< 1.0	-	-
Endrin	mg/kg dry wt	-	-	< 0.7	-	-
Endrin ketone	mg/kg dry wt	-	-	< 1.0	-	-
Heptachlor	mg/kg dry wt	-	-	< 0.5	-	-
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.5	-	-
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	-	< 0.5	-	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.5	-	-
Anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
1&2-Chloronaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Chrysene	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Fluorene	mg/kg dry wt	-	-	< 0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.5	-	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Naphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Phenanthrene	mg/kg dry wt	-	-	< 0.5	-	-

Sample Type: Soil						
Sample Name:		TP08 0.1 15-Apr-2021	TP09 0.1 15-Apr-2021	TP09 1.2 15-Apr-2021	TP10 0.1 15-Apr-2021	TP11 0.1 15-Apr-2021
Lab Number:		2586323.14	2586323.16	2586323.17	2586323.18	2586323.19
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Pyrene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 1.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 1.3	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	< 5	-	-
2-Chlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dimethylphenol	mg/kg dry wt	-	-	< 3	-	-
3 & 4-Methylphenol (m- + p- cresol)	mg/kg dry wt	-	-	< 3	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	< 1.0	-	-
2-Nitrophenol	mg/kg dry wt	-	-	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	< 30	-	-
Phenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	< 5	-	-
Butylbenzylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	< 1.0	-	-
Diethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Dimethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-butylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-octylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	< 0.7	-	-
1,3-Dichlorobenzene	mg/kg dry wt	-	-	< 0.7	-	-
1,4-Dichlorobenzene	mg/kg dry wt	-	-	< 0.7	-	-
Hexachlorobutadiene	mg/kg dry wt	-	-	< 0.7	-	-
Hexachloroethane	mg/kg dry wt	-	-	< 0.7	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	< 10	-	-
Carbazole	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzofuran	mg/kg dry wt	-	-	< 0.5	-	-
Isophorone	mg/kg dry wt	-	-	< 0.5	-	-
Sample Name:		TP12 0.1 15-Apr-2021	TP12 0.4 15-Apr-2021			
Lab Number:		2586323.20	2586323.21			
Individual Tests						
Dry Matter	g/100g as rcvd	80	-	-	-	-
Total Recoverable Mercury	mg/kg dry wt	-	0.21	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	10	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	-	0.37	-	-	-
Total Recoverable Chromium	mg/kg dry wt	-	18	-	-	-
Total Recoverable Copper	mg/kg dry wt	-	40	-	-	-
Total Recoverable Lead	mg/kg dry wt	-	30	-	-	-
Total Recoverable Nickel	mg/kg dry wt	-	17	-	-	-
Total Recoverable Zinc	mg/kg dry wt	-	88	-	-	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	10	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.17	-	-	-	-

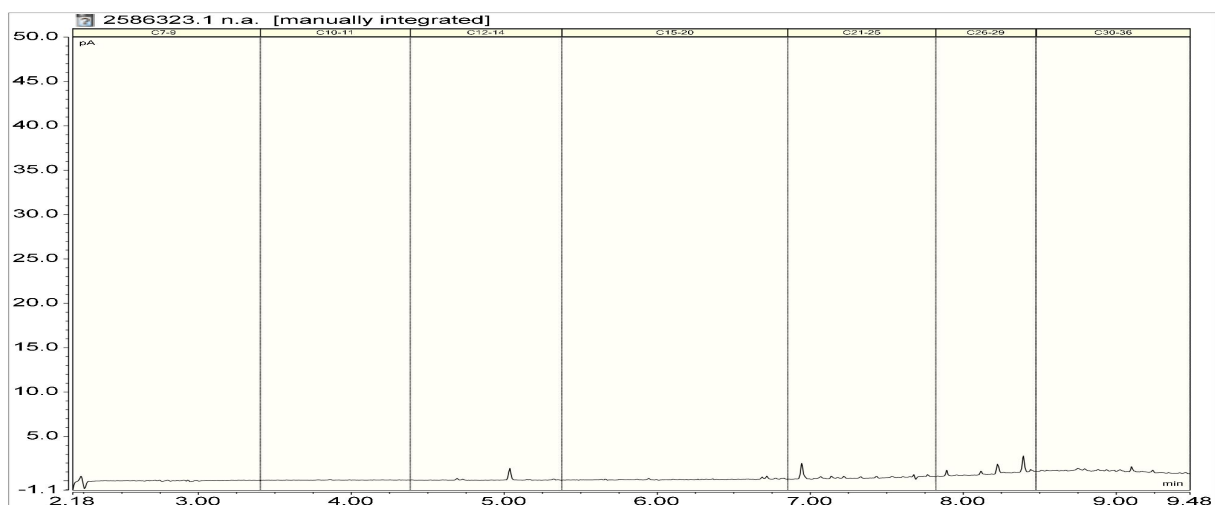
Sample Type: Soil

Sample Name:		TP12 0.1 15-Apr-2021	TP12 0.4 15-Apr-2021			
Lab Number:		2586323.20	2586323.21			
Heavy Metals with Mercury, Screen Level						
Total Recoverable Chromium	mg/kg dry wt	17	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	40	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	27	-	-	-	-
Total Recoverable Mercury	mg/kg dry wt	0.16	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	16	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	84	-	-	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.012	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.012	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.012	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.012	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.012	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.012	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.012	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.012	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.012	-	-	-	-
4,4'-DDE	mg/kg dry wt	0.059	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.012	-	-	-	-
4,4'-DDT	mg/kg dry wt	0.038	-	-	-	-
Total DDT Isomers	mg/kg dry wt	0.10	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.012	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.012	-	-	-	-
Endosulfan II	mg/kg dry wt	< 0.012	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.012	-	-	-	-
Endrin	mg/kg dry wt	< 0.012	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.012	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.012	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.012	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.012	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.012	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.012	-	-	-	-

2586323.1

TP01 0-0.2 15-Apr-2021

Client Chromatogram for TPH by FID



Analyst's Comments

Amended Report: This certificate of analysis replaces report '2586323-SPv2' issued on 13-May-2021 at 11:32 am.
Reason for amendment: Mercury added as per client request.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 3, 5, 7, 9-10, 12-14, 16-21
Soil Prep Dry for Organics, Trace*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 5, 9
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	3, 7, 16
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1, 3-5, 7, 9-12, 16-20
Total Recoverable Boron	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	20 mg/kg dry wt	5, 14, 19
Total Recoverable Mercury	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.10 mg/kg dry wt	1, 3, 5, 7, 9, 16-18, 21
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	3, 7, 16
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	3, 7, 16
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	3
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 3, 5, 7, 9, 13, 16-18, 21
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	10, 12, 14, 19-20
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	7, 9-10, 12, 16, 18-20
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 0.05 mg/kg dry wt	7, 16
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction, LC-MS/MS analysis. Tested on dried sample. In-house.	0.010 mg/kg dry wt	1, 5, 9
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 30 mg/kg dry wt	4, 11, 17
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	1
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	8 mg/kg dry wt	1, 3, 5

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1, 3, 5
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1, 3, 5
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1, 3, 5

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 20-Apr-2021 and 14-May-2021. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Ara Heron BSc (Tech)
Client Services Manager - Environmental



Certificate of Analysis

Page 1 of 2

Client:	Engeo Limited	Lab No:	2608815	SPv2
Contact:	Calum MacRae	Date Received:	11-May-2021	
	C/- Engeo Limited	Date Reported:	18-May-2021	(Amended)
	PO Box 25047	Quote No:	82742	
	Wellington 6146	Order No:		
		Client Reference:	234 Rangioru	
		Submitted By:	Calum MacRae	

Sample Type: Soil

Sample Name:	TP01 A	TP01 B	TP01 C	TP01 D	TP01 E
	11-May-2021	11-May-2021	11-May-2021	11-May-2021	11-May-2021
Lab Number:	2608815.1	2608815.2	2608815.3	2608815.4	2608815.5

Heavy Metals with Mercury, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	48	16	27	60	49
Total Recoverable Cadmium	mg/kg dry wt	0.23	0.21	0.18	0.26	0.25
Total Recoverable Chromium	mg/kg dry wt	16	17	16	16	16
Total Recoverable Copper	mg/kg dry wt	38	44	55	194	77
Total Recoverable Lead	mg/kg dry wt	35	33	34	47	34
Total Recoverable Mercury	mg/kg dry wt	0.13	0.26	0.19	0.31	0.13
Total Recoverable Nickel	mg/kg dry wt	15	16	16	15	16
Total Recoverable Zinc	mg/kg dry wt	111	105	98	128	108

Sample Name:	TP04 A	TP04 B	TP04 C	TP04 D	TP09 A
	11-May-2021	11-May-2021	11-May-2021	11-May-2021	11-May-2021
Lab Number:	2608815.6	2608815.7	2608815.8	2608815.9	2608815.14

Heavy Metals with Mercury, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	16	14	19	18	19
Total Recoverable Cadmium	mg/kg dry wt	0.17	0.13	0.17	0.16	0.33
Total Recoverable Chromium	mg/kg dry wt	15	16	18	15	16
Total Recoverable Copper	mg/kg dry wt	28	32	36	32	46
Total Recoverable Lead	mg/kg dry wt	34	38	46	28	32
Total Recoverable Mercury	mg/kg dry wt	0.14	0.12	< 0.10	0.14	0.12
Total Recoverable Nickel	mg/kg dry wt	15	15	15	14	15
Total Recoverable Zinc	mg/kg dry wt	91	101	115	89	119

Sample Name:	TP09 B				
	11-May-2021				
Lab Number:	2608815.15				

Heavy Metals with Mercury, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	18	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.24	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	15	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	44	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	29	-	-	-	-
Total Recoverable Mercury	mg/kg dry wt	0.11	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	15	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	109	-	-	-	-

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2608815-SPv1' issued on 14-May-2021 at 11:50 am.
Reason for amendment: Metals added to 3 samples as per client.

Appendix No.1 - Chain of Custody



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-9, 14-15
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-9, 14-15

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 14-May-2021 and 18-May-2021. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Ara Heron BSc (Tech)
Client Services Manager - Environmental



ANALYSIS REQUEST

Quote No

Primary Contact **C MACRAE**Submitted By **1)**Client Name **ENGEO**

Address

Postcode

Phone

Mobile

Email

Charge To **234 RANGIURU / ENGEO**

Client Reference

Order No

Results To

Reports will be emailed to Primary Contact by default.
Additional Reports will be sent as specified below.

☐ Email Primary Contact ☐ Email Submitter ☐ Email Client

☐ Email Other

☐ Other

R J Hill Laboratories Limited
3/204 Thorndon Quay
Pipitea
Wellington 6011
New Zealand

Job No: Date Recv: **11-May-21 12:08**

260 8815

Received by: **Zandra Edwards**

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com



3126088154

18.7°C

CHAIN OF CUSTODY RECORD

Sent to
Hill Laboratories

Date & Time:

Name:

☐ Tick if you require COC
to be emailed back

Signature:

Samples will be processed at a Hill Laboratories site with the appropriate
testing capability and capacity. Please inform the Laboratory if you wish
samples to be retained and analysed at the site of receipt.

Received at
Hill Laboratories

Date & Time:

Name:

Signature:

Priority ☐ Low ☒ Normal ☐ High
☐ Urgent (ASAP extra charge applies, please contact lab first)

Requested Reporting Date:

Please ensure all asbestos samples are individually
double bagged upon submission to the laboratory.

ADDITIONAL INFORMATION

Hold & Cold = H & C

No.	Sample Name	Sample Material	Sample Location	Sample Date	Tests Required (if not as per Quote)
1	TP01 A	SOIL	-	11/05/21	H & C
2	TP01 B	"	-	"	"
3	TP01 C	"	-	"	"
4	TP01 D	"	-	"	"
5	TP01 E	"	-	"	"
6	TP04 A	"	-	"	"
7	TP04 B	"	-	"	"
8	TP04 C	"	-	"	"
9	TP04 D	"	-	"	"
10	TP04 E	"	-	"	"
	TP04 F	"	"	"	"
	TP04 G	"	"	"	"
	TP04 H	"	"	"	"
	TP09 A	"	"	"	"
	TP09 B	"	"	"	"
	TP09 C	"	"	"	"



Certificate of Analysis

Page 1 of 1

Client:	Engeo Limited	Lab No:	2877155	SPv1
Contact:	Karen Jones	Date Received:	17-Feb-2022	
	C/- Engeo Limited	Date Reported:	23-Feb-2022	
	PO Box 25047	Quote No:	82742	
	Wellington 6146	Order No:	18634	
		Client Reference:	Rangiuru	
		Submitted By:	Calum MacRae	

Sample Type: Soil

	Sample Name:	ASA 16-Feb-2022	ASB 16-Feb-2022	ASC 16-Feb-2022	ASD 16-Feb-2022	
	Lab Number:	2877155.3	2877155.4	2877155.5	2877155.6	
Total Recoverable Arsenic	mg/kg dry wt	32	11	13	32	-

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	3-6
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%.	-	3-6
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	3-6
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	3-6

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed on 23-Feb-2022. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Kim Harrison MSc
Client Services Manager - Environmental



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Certificate of Analysis

Page 1 of 10

Client:	Engeo Limited	Lab No:	2941568	SPv1
Contact:	Karen Jones	Date Received:	01-Apr-2022	
	C/- Engeo Limited	Date Reported:	07-Apr-2022	
	PO Box 25047	Quote No:	117190	
	Wellington 6146	Order No:	18634	
		Client Reference:	18634	
		Submitted By:	Calum MacRae	

Sample Type: Soil

Sample Name:	PS01	PS02	PS03	PS03a	PS04
	30-Mar-2022	30-Mar-2022	30-Mar-2022	30-Mar-2022	30-Mar-2022
Lab Number:	2941568.1	2941568.2	2941568.3	2941568.4	2941568.5

Individual Tests

Dry Matter	g/100g as rcvd	-	66	72	79	80
Total Recoverable Boron	mg/kg dry wt	-	-	-	-	< 20

Heavy Metals, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	17	19	19	15	-
Total Recoverable Cadmium	mg/kg dry wt	0.49	0.56	< 0.3	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	16	18	16	19	-
Total Recoverable Copper	mg/kg dry wt	40	30	35	24	-
Total Recoverable Lead	mg/kg dry wt	49	89	28	28	-
Total Recoverable Nickel	mg/kg dry wt	15	14	14	17	-
Total Recoverable Zinc	mg/kg dry wt	111	310	99	84	-

Heavy Metals with Mercury, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	-	-	-	-	11
Total Recoverable Cadmium	mg/kg dry wt	-	-	-	-	0.16
Total Recoverable Chromium	mg/kg dry wt	-	-	-	-	19
Total Recoverable Copper	mg/kg dry wt	-	-	-	-	52
Total Recoverable Lead	mg/kg dry wt	-	-	-	-	27
Total Recoverable Mercury	mg/kg dry wt	-	-	-	-	0.18
Total Recoverable Nickel	mg/kg dry wt	-	-	-	-	16
Total Recoverable Zinc	mg/kg dry wt	-	-	-	-	88

Organochlorine Pesticides Screening in Soil

Aldrin	mg/kg dry wt	-	< 0.015	-	-	-
alpha-BHC	mg/kg dry wt	-	< 0.015	-	-	-
beta-BHC	mg/kg dry wt	-	< 0.015	-	-	-
delta-BHC	mg/kg dry wt	-	< 0.015	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	-	< 0.015	-	-	-
cis-Chlordane	mg/kg dry wt	-	< 0.015	-	-	-
trans-Chlordane	mg/kg dry wt	-	< 0.015	-	-	-
2,4'-DDD	mg/kg dry wt	-	< 0.015	-	-	-
4,4'-DDD	mg/kg dry wt	-	< 0.015	-	-	-
2,4'-DDE	mg/kg dry wt	-	< 0.015	-	-	-
4,4'-DDE	mg/kg dry wt	-	< 0.015	-	-	-
2,4'-DDT	mg/kg dry wt	-	< 0.015	-	-	-
4,4'-DDT	mg/kg dry wt	-	< 0.015	-	-	-
Total DDT Isomers	mg/kg dry wt	-	< 0.09	-	-	-
Dieldrin	mg/kg dry wt	-	< 0.015	-	-	-
Endosulfan I	mg/kg dry wt	-	< 0.015	-	-	-
Endosulfan II	mg/kg dry wt	-	< 0.015	-	-	-
Endosulfan sulphate	mg/kg dry wt	-	< 0.015	-	-	-



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Sample Type: Soil						
Sample Name:		PS01 30-Mar-2022	PS02 30-Mar-2022	PS03 30-Mar-2022	PS03a 30-Mar-2022	PS04 30-Mar-2022
Lab Number:		2941568.1	2941568.2	2941568.3	2941568.4	2941568.5
Organochlorine Pesticides Screening in Soil						
Endrin	mg/kg dry wt	-	< 0.015	-	-	-
Endrin aldehyde	mg/kg dry wt	-	< 0.015	-	-	-
Endrin ketone	mg/kg dry wt	-	< 0.015	-	-	-
Heptachlor	mg/kg dry wt	-	< 0.015	-	-	-
Heptachlor epoxide	mg/kg dry wt	-	< 0.015	-	-	-
Hexachlorobenzene	mg/kg dry wt	-	< 0.015	-	-	-
Methoxychlor	mg/kg dry wt	-	< 0.015	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	< 0.4	< 0.4	-
1-Methylnaphthalene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Acenaphthene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Anthracene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 0.04	< 0.04	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 0.04	< 0.04	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Benzo[e]pyrene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Chrysene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Fluoranthene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Fluorene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Naphthalene	mg/kg dry wt	-	-	< 0.07	< 0.07	-
Perylene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Phenanthrene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Pyrene	mg/kg dry wt	-	-	< 0.014	< 0.013	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	-	-	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	-	-	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	-	-	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	-	-	< 0.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	-	-	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	-	-	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	-	-	-	-	< 1.0
Nitrobenzene	mg/kg dry wt	-	-	-	-	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	-	-	< 0.8
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	-	-	< 0.8
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	-	-	< 0.5
alpha-BHC	mg/kg dry wt	-	-	-	-	< 0.5
beta-BHC	mg/kg dry wt	-	-	-	-	< 0.5
delta-BHC	mg/kg dry wt	-	-	-	-	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	-	-	-	-	< 0.5
4,4'-DDD	mg/kg dry wt	-	-	-	-	< 0.5
4,4'-DDE	mg/kg dry wt	-	-	-	-	< 0.5
4,4'-DDT	mg/kg dry wt	-	-	-	-	< 1.0

Sample Type: Soil						
Sample Name:		PS01 30-Mar-2022	PS02 30-Mar-2022	PS03 30-Mar-2022	PS03a 30-Mar-2022	PS04 30-Mar-2022
Lab Number:		2941568.1	2941568.2	2941568.3	2941568.4	2941568.5
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Dieldrin	mg/kg dry wt	-	-	-	-	< 0.5
Endosulfan I	mg/kg dry wt	-	-	-	-	< 1.0
Endosulfan II	mg/kg dry wt	-	-	-	-	< 2
Endosulfan sulphate	mg/kg dry wt	-	-	-	-	< 1.0
Endrin	mg/kg dry wt	-	-	-	-	< 0.8
Endrin ketone	mg/kg dry wt	-	-	-	-	< 1.0
Heptachlor	mg/kg dry wt	-	-	-	-	< 0.5
Heptachlor epoxide	mg/kg dry wt	-	-	-	-	< 0.5
Hexachlorobenzene	mg/kg dry wt	-	-	-	-	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	-	-	-	-	< 0.5
Acenaphthylene	mg/kg dry wt	-	-	-	-	< 0.5
Anthracene	mg/kg dry wt	-	-	-	-	< 0.5
Benzo[a]anthracene	mg/kg dry wt	-	-	-	-	< 0.5
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	-	< 0.5
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	-	-	-	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	-	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	-	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	-	-	-	-	< 0.5
Chrysene	mg/kg dry wt	-	-	-	-	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	-	< 0.5
Fluoranthene	mg/kg dry wt	-	-	-	-	< 0.5
Fluorene	mg/kg dry wt	-	-	-	-	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	-	< 0.5
2-Methylnaphthalene	mg/kg dry wt	-	-	-	-	< 0.5
Naphthalene	mg/kg dry wt	-	-	-	-	< 0.5
Phenanthrene	mg/kg dry wt	-	-	-	-	< 0.5
Pyrene	mg/kg dry wt	-	-	-	-	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	-	-	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	-	< 1.3
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	-	-	< 5
2-Chlorophenol	mg/kg dry wt	-	-	-	-	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	-	-	-	-	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	-	-	-	-	< 3
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	-	-	-	-	< 3
2-Methylphenol (o-cresol)	mg/kg dry wt	-	-	-	-	< 1.0
2-Nitrophenol	mg/kg dry wt	-	-	-	-	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	-	-	< 30
Phenol	mg/kg dry wt	-	-	-	-	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	-	-	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	-	-	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	-	-	< 5
Butylbenzylphthalate	mg/kg dry wt	-	-	-	-	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	-	-	< 1.0
Diethylphthalate	mg/kg dry wt	-	-	-	-	< 1.0
Dimethylphthalate	mg/kg dry wt	-	-	-	-	< 1.0
Di-n-butylphthalate	mg/kg dry wt	-	-	-	-	< 1.0
Di-n-octylphthalate	mg/kg dry wt	-	-	-	-	< 1.0

Sample Type: Soil						
Sample Name:		PS01 30-Mar-2022	PS02 30-Mar-2022	PS03 30-Mar-2022	PS03a 30-Mar-2022	PS04 30-Mar-2022
Lab Number:		2941568.1	2941568.2	2941568.3	2941568.4	2941568.5
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	-	-	< 0.8
1,3-Dichlorobenzene	mg/kg dry wt	-	-	-	-	< 0.8
1,4-Dichlorobenzene	mg/kg dry wt	-	-	-	-	< 0.8
Hexachlorobutadiene	mg/kg dry wt	-	-	-	-	< 0.8
Hexachloroethane	mg/kg dry wt	-	-	-	-	< 0.8
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	-	-	< 0.5
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	-	-	< 10
Carbazole	mg/kg dry wt	-	-	-	-	< 0.5
Dibenzofuran	mg/kg dry wt	-	-	-	-	< 0.5
Isophorone	mg/kg dry wt	-	-	-	-	< 0.5
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	< 20	< 20	-
C10 - C14	mg/kg dry wt	-	-	< 20	< 20	-
C15 - C36	mg/kg dry wt	-	-	69	< 40	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	< 80	< 80	-
Sample Name:		PS04a 30-Mar-2022	PS05 30-Mar-2022	PS06 30-Mar-2022	PS06a 30-Mar-2022	PS07 30-Mar-2022
Lab Number:		2941568.6	2941568.7	2941568.9	2941568.10	2941568.11
Individual Tests						
Dry Matter	g/100g as rcvd	81	80	79	81	74
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	-	-	< 20
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	-	21	11	-
Total Recoverable Cadmium	mg/kg dry wt	-	-	0.20	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	-	-	18	19	-
Total Recoverable Copper	mg/kg dry wt	-	-	43	21	-
Total Recoverable Lead	mg/kg dry wt	-	-	47	30	-
Total Recoverable Nickel	mg/kg dry wt	-	-	16	17	-
Total Recoverable Zinc	mg/kg dry wt	-	-	93	80	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	11	-	-	16
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.15	-	-	0.14
Total Recoverable Chromium	mg/kg dry wt	18	19	-	-	17
Total Recoverable Copper	mg/kg dry wt	32	50	-	-	37
Total Recoverable Lead	mg/kg dry wt	27	29	-	-	32
Total Recoverable Mercury	mg/kg dry wt	0.17	0.17	-	-	0.13
Total Recoverable Nickel	mg/kg dry wt	17	17	-	-	15
Total Recoverable Zinc	mg/kg dry wt	86	93	-	-	88
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	< 0.3	< 0.3	-
1-Methylnaphthalene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Acenaphthene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Anthracene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 0.03	< 0.03	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Benzo[e]pyrene	mg/kg dry wt	-	-	< 0.013	< 0.013	-

Sample Type: Soil						
Sample Name:		PS04a 30-Mar-2022	PS05 30-Mar-2022	PS06 30-Mar-2022	PS06a 30-Mar-2022	PS07 30-Mar-2022
Lab Number:		2941568.6	2941568.7	2941568.9	2941568.10	2941568.11
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Chrysene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Fluoranthene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Fluorene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Naphthalene	mg/kg dry wt	-	-	< 0.07	< 0.07	-
Perylene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Phenanthrene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Pyrene	mg/kg dry wt	-	-	< 0.013	< 0.013	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.4	-	-	< 0.4
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.8	< 0.8	-	-	< 0.8
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.8	< 0.8	-	-	< 0.8
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
Endosulfan II	mg/kg dry wt	< 2	< 2	-	-	< 2
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
Endrin	mg/kg dry wt	< 0.8	< 0.8	-	-	< 0.8
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Anthracene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Chrysene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5

Sample Type: Soil						
Sample Name:		PS04a 30-Mar-2022	PS05 30-Mar-2022	PS06 30-Mar-2022	PS06a 30-Mar-2022	PS07 30-Mar-2022
Lab Number:		2941568.6	2941568.7	2941568.9	2941568.10	2941568.11
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Fluorene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Pyrene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	-	-	< 1.3
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	-	-	< 1.3
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	-	-	< 5
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	-	-	< 3
3 & 4-Methylphenol (m- + p- cresol)	mg/kg dry wt	< 3	< 3	-	-	< 3
2-Methylphenol (o-cresol)	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
2-Nitrophenol	mg/kg dry wt	< 5	< 5	-	-	< 5
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	-	-	< 30
Phenol	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	-	-	< 5
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	< 1.0
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	-	-	< 0.8
1,3-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	-	-	< 0.8
1,4-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	-	-	< 0.8
Hexachlorobutadiene	mg/kg dry wt	< 0.8	< 0.8	-	-	< 0.8
Hexachloroethane	mg/kg dry wt	< 0.8	< 0.8	-	-	< 0.8
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	-	-	< 10
Carbazole	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Isophorone	mg/kg dry wt	< 0.5	< 0.5	-	-	< 0.5
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	< 20	< 20	-
C10 - C14	mg/kg dry wt	-	-	< 20	< 20	-
C15 - C36	mg/kg dry wt	-	-	< 40	< 40	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	< 80	< 80	-
Sample Name:		PS13 30-Mar-2022	PS13a 30-Mar-2022			
Lab Number:		2941568.13	2941568.14			
Individual Tests						
Dry Matter	g/100g as rcvd	76	84	-	-	-
Total Recoverable Boron	mg/kg dry wt	< 50	< 20	-	-	-

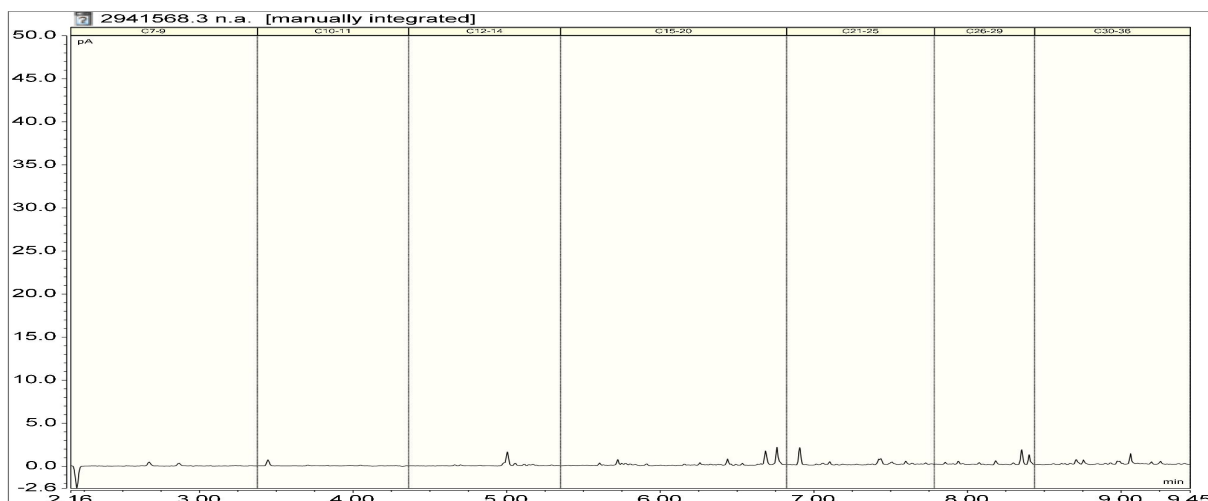
Sample Type: Soil						
Sample Name:		PS13 30-Mar-2022	PS13a 30-Mar-2022			
Lab Number:		2941568.13	2941568.14			
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	15	10	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.5	0.19	-	-	-
Total Recoverable Chromium	mg/kg dry wt	17	18	-	-	-
Total Recoverable Copper	mg/kg dry wt	36	20	-	-	-
Total Recoverable Lead	mg/kg dry wt	25	27	-	-	-
Total Recoverable Mercury	mg/kg dry wt	< 0.3	0.17	-	-	-
Total Recoverable Nickel	mg/kg dry wt	15	18	-	-	-
Total Recoverable Zinc	mg/kg dry wt	82	80	-	-	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 0.5	< 0.5	-	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 0.4	< 0.4	-	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	-	-	-
2,6-Dinitrotoluene	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Nitrobenzene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 0.8	< 0.8	-	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	< 0.8	< 0.8	-	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	< 0.5	< 0.5	-	-	-
alpha-BHC	mg/kg dry wt	< 0.5	< 0.5	-	-	-
beta-BHC	mg/kg dry wt	< 0.5	< 0.5	-	-	-
delta-BHC	mg/kg dry wt	< 0.5	< 0.5	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.5	< 0.5	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.5	< 0.5	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.5	< 0.5	-	-	-
4,4'-DDT	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Dieldrin	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Endosulfan I	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Endosulfan II	mg/kg dry wt	< 2	< 2	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Endrin	mg/kg dry wt	< 0.8	< 0.8	-	-	-
Endrin ketone	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Heptachlor	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
Acenaphthene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Anthracene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
1&2-Chloronaphthalene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Chrysene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Fluoranthene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Fluorene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.5	< 0.5	-	-	-

Sample Type: Soil						
Sample Name:		PS13 30-Mar-2022	PS13a 30-Mar-2022			
Lab Number:		2941568.13	2941568.14			
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS*						
2-Methylnaphthalene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Naphthalene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Phenanthrene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Pyrene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 1.3	< 1.3	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 1.3	< 1.3	-	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	< 5	-	-	-
2-Chlorophenol	mg/kg dry wt	< 1.0	< 1.0	-	-	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.0	< 1.0	-	-	-
2,4-Dimethylphenol	mg/kg dry wt	< 3	< 3	-	-	-
3 & 4-Methylphenol (m- + p- cresol)	mg/kg dry wt	< 3	< 3	-	-	-
2-Methylphenol (o-cresol)	mg/kg dry wt	< 1.0	< 1.0	-	-	-
2-Nitrophenol	mg/kg dry wt	< 5	< 5	-	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	< 30	< 30	-	-	-
Phenol	mg/kg dry wt	< 1.0	< 1.0	-	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	-	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	< 5	< 5	-	-	-
Butylbenzylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Diethylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Dimethylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Di-n-butylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Di-n-octylphthalate	mg/kg dry wt	< 1.0	< 1.0	-	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	-	-	-
1,3-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	-	-	-
1,4-Dichlorobenzene	mg/kg dry wt	< 0.8	< 0.8	-	-	-
Hexachlorobutadiene	mg/kg dry wt	< 0.8	< 0.8	-	-	-
Hexachloroethane	mg/kg dry wt	< 0.8	< 0.8	-	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	< 10	< 10	-	-	-
Carbazole	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Dibenzofuran	mg/kg dry wt	< 0.5	< 0.5	-	-	-
Isophorone	mg/kg dry wt	< 0.5	< 0.5	-	-	-

2941568.3

PS03 30-Mar-2022

Client Chromatogram for TPH by FID



Analyst's Comments

Appendix No.1 - Chain of Custody

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-7, 9-11, 13-14
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	3-4, 9-10
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	2-7, 9-11, 13-14
Total Recoverable Boron	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	20 mg/kg dry wt	5-7, 11, 13-14
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	3-4, 9-10
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	3-4, 9-10
TPH Oil Industry Profile + PAHscreen	Sonication extraction, GC-FID and GC-MS analysis. Tested on as received sample. In-house based on US EPA 8015 and US EPA 8270.	0.002 - 70 mg/kg dry wt	3-4, 9-10
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-4, 9-10
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	5-7, 11, 13-14

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	2
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 30 mg/kg dry wt	5-7, 11, 13-14
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	3
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	3-4, 9-10
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	3-4, 9-10
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	3-4, 9-10
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	3-4, 9-10

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 05-Apr-2022 and 07-Apr-2022. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech)
Client Services Manager - Environmental



Quote No 117190 but hold cold for now as below

Primary Contact Karen Jones

Submitted By Calum MacRae

Client Name ENGEO

Address

Postcode

Phone Mobile

Email kjones@engeo.co.nz

Charge To ENGEO

Client Reference 234 Rangiuru Road

Order No 18634

Results To Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.

☒ Email Primary Contact ☐ Email Submitter ☐ Email Client

☐ Email Other

☐ Other

ADDITIONAL INFORMATION

HM = Heavy Metals
SQA = Semi-Quantitative Asbestos

ANALYSIS REQUEST

R J Hill Laboratories Limited
28 Duke Street, Hamilton 3204
Private Bag 3205
Hamilton 3240, New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Job No: Date Recv: 01-Apr-22 14:21
294 1568
Received by: Kelsey Rohloff
3129415683

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories Date & Time: 01/04/22

Name: Karen Jones

☐ Tick if you require COC to be emailed back Signature: Karen Jones

Received at Hill Laboratories Date & Time:

Name:

Signature:

Condition ☐ Room Temp ☒ Chilled ☐ Frozen Temp: 9.9°C

☐ Sample and Analysis details checked

Signature:

Priority ☐ Low ☒ Normal ☐ High

☐ Urgent (ASAP, extra charge applies, please contact lab first)

Requested Reporting Date:

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	PS01	30/03/2022	-	SOIL	HM & SQA
2	PS02	30/03/2022	-	SOIL	HM, SQA & OCP
3	PS03	30/03/2022	-	SOIL	Hold cold
4	PS03a	30/03/2022	-	SOIL	Hold cold
5	PS04	30/03/2022	☐	SOIL	Hold cold
6	PS04a	30/03/2022	-	SOIL	Hold cold
7	PS05	30/03/2022	-	SOIL	Hold cold
8	PS05a	30/03/2022	-	SOIL	Hold cold
9	PS06	30/03/2022	-	SOIL	Hold cold
10	PS06a	30/03/2022	-	SOIL	Hold cold
11	PS07	30/03/2022	-	SOIL	Hold cold
12	PS07a	30/03/2022	-	SOIL	Hold cold

Continued on next page

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
13	PS13	30/03/2022	-	SOIL	Hold cold
14	PS13a	30/03/2022	-	SOIL	Hold cold
15					
16					
17					
18					
19					
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40					



Certificate of Analysis

Page 1 of 3

Client:	Engeo Limited	Lab No:	2941570	A2Pv1
Contact:	Karen Jones	Date Received:	01-Apr-2022	
	C/- Engeo Limited	Date Reported:	08-Apr-2022	
	PO Box 25047	Quote No:	117190	
	Wellington 6146	Order No:	18634	
		Client Reference:	234 Rangioru Road	
		Submitted By:	Karen Jones	

Sample Type: Soil

Sample Name:	PS01	PS02	PS03	PS03a	PS06
Lab Number:	2941570.1	2941570.2	2941570.3	2941570.4	2941570.5
Asbestos Presence / Absence	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form	-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	-	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	-	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	-	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w < 0.001	% w/w < 0.001	-	-	-
As Received Weight	g 787.1	g 664.5	g 299.6	g 377.7	g 293.1
Dry Weight	g 598.6	g 435.3	g 215.7	g 295.4	g 230.8
Moisture	% 24	% 34	-	-	-
Sample Fraction >10mm*	g dry wt < 0.1	g dry wt < 0.1	g dry wt < 0.1	g dry wt 3.2	g dry wt 3.6
Sample Fraction <10mm to >2mm*	g dry wt 274.2	g dry wt 250.4	g dry wt 107.7	g dry wt 179.2	g dry wt 137.7
Sample Fraction <2mm*	g dry wt 323.4	g dry wt 185.0	g dry wt 107.3	g dry wt 112.5	g dry wt 89.1
<2mm Subsample Weight*	g dry wt 51.7	g dry wt 51.7	g dry wt 51.2	g dry wt 50.3	g dry wt 53.5
Weight of Asbestos in >10mm Sample Fraction	g dry wt -	g dry wt -	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001
Weight of Asbestos in <10mm to >2mm Sample Fraction	g dry wt -	g dry wt -	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001
Weight of Asbestos in <2mm Sample Fraction	g dry wt -	g dry wt -	g dry wt < 0.00001	g dry wt < 0.00001	g dry wt < 0.00001
Weight of Asbestos in ACM (Non-Friable)	g dry wt < 0.00001	g dry wt < 0.00001	-	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)*	g dry wt < 0.00001	g dry wt < 0.00001	-	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt < 0.00001	g dry wt < 0.00001	-	-	-

Sample Name:	PS06a				
Lab Number:	2941570.6				
Asbestos Presence / Absence	Asbestos NOT detected.	-	-	-	-
Description of Asbestos Form	-	-	-	-	-
As Received Weight	g 287.3	-	-	-	-
Dry Weight	g 230.4	-	-	-	-
Sample Fraction >10mm*	g dry wt < 0.1	-	-	-	-
Sample Fraction <10mm to >2mm*	g dry wt 119.6	-	-	-	-
Sample Fraction <2mm*	g dry wt 110.3	-	-	-	-



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		PS06a				
Lab Number:		2941570.6				
<2mm Subsample Weight*	g dry wt	51.8	-	-	-	-
Weight of Asbestos in >10mm Sample Fraction	g dry wt	< 0.00001	-	-	-	-
Weight of Asbestos in <10mm to >2mm Sample Fraction	g dry wt	< 0.00001	-	-	-	-
Weight of Asbestos in <2mm Sample Fraction	g dry wt	< 0.00001	-	-	-	-

Glossary of Terms

- Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
 - Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
 - ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
 - ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
 - Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
 - Trace - Trace levels of asbestos, as defined by AS4964-2004.
- For further details, please contact the Asbestos Team.

Testing has been carried out under the assumption that the weight of asbestos in the sample is unaffected by the ashing process.

Analyst's Comments

Appendix No.1 - Chain of Custody

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Semi Quantitative Asbestos in Soil*	Based on approximately 100g of sample provided.	-	3-6
Semi Quantitative Asbestos in Soil			
Weight of Asbestos in >10mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.00001 g dry wt	3-6
Weight of Asbestos in <10mm to >2mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.00001 g dry wt	3-6
Weight of Asbestos in <2mm Sample Fraction	Measurement on analytical balance. Asbestos weight in <2mm subsample, if <2mm subsample weight is not "Entire Fraction". Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.00001 g dry wt	3-6
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-6
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1-6
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-2
Sample Fraction >10mm*	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-6
Sample Fraction <10mm to >2mm*	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-6
Sample Fraction <2mm*	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1-6
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-6
Description of Asbestos Form	Description of asbestos form and/or shape if present. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	-	1-6

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2
Weight of Asbestos as Fibrous Asbestos (Friable)*	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 05-Apr-2022 and 08-Apr-2022. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Keith Benson HNC Chem
Laboratory Technician - Asbestos



Hill Laboratories

TRIED, TESTED AND TRUSTED

Quote No 117190 but hold cold for now as below

Primary Contact Karen Jones

Submitted By Calum MacRae

Client Name ENGEO

Address

Postcode

Phone

Mobile

Email kjones@engeo.co.nz

Charge To ENGEO

Client Reference 234 Rangioru Road

Order No 18634

Results To Reports will be emailed to Primary Contact by default.
Additional Reports will be sent as specified below.

☒ Email Primary Contact ☐ Email Submitter ☐ Email Client

☐ Email Other

☐ Other

ADDITIONAL INFORMATION

HM = Heavy Metals

SQA = Semi-Quantitative Asbestos

ANALYSIS REQUEST

R J Hill Laboratories Limited
28 Duke Street, Hamilton 3204
Private Bag 3205
Hamilton 3240, New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Job No:

Date Recv: 01-Apr-22 14:26

294 1570

Received by: Kelsey Rohloff



3129415707

CHAIN OF CUSTODY RECORD

Sent to

Hill Laboratories

Date & Time: 01/04/22

Name: Karen Jones

☐ Tick if you require COC
to be emailed back

Signature: Karen Jones

Received at
Hill Laboratories

Date & Time:

Name:

Signature:

Condition

☐ Room Temp

☒ Chilled

☐ Frozen

Temp:
9.9°C

☐ Sample and Analysis details checked

Signature:

Priority

☐ Low

☒ Normal

☐ High

☐ Urgent (ASAP, extra charge applies, please contact lab first)

Requested Reporting Date:

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	PS01	30/03/2022	-	SOIL	HM & SQA
2	PS02	30/03/2022	-	SOIL	HM, SQA & OCP
3	PS03	30/03/2022	-	SOIL	Hold cold
4	PS03a	30/03/2022	-	SOIL	Hold cold
5	PS04	30/03/2022	-	SOIL	Hold cold
6	PS04a	30/03/2022	-	SOIL	Hold cold
7	PS05	30/03/2022	-	SOIL	Hold cold
8	PS05a	30/03/2022	-	SOIL	Hold cold
9	PS06	30/03/2022	-	SOIL	Hold cold
10	PS06a	30/03/2022	-	SOIL	Hold cold
11	PS07	30/03/2022	-	SOIL	Hold cold
12	PS07a	30/03/2022	-	SOIL	Hold cold

Continued on next page

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
13	PS13	30/03/2022	-	SOIL	Hold cold
14	PS13a	30/03/2022	-	SOIL	Hold cold
15					
16					
17					
18					
19					
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APPENDIX 3: Soil Logs

LOG OF TEST PIT TP01

Geotechnical Investigation

234 Rangiuru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ **Shear Vane No** : 1371
Date : 15/04/2021 **Logged By** : CM
Max Test Pit Depth : 1.8 m **Reviewed By** : CC
Digger Type/Size : Bucket Excavator **Latitude** : -40.753266
Bucket Type/Size : Toothed / 600 mm wide **Longitude** : 175.131759

Depth (m BGL)	Material	Excavatability (Relative Scale)	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane, Su Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
		Easier	Harder								2 4 6 8 10 12
0.5	FILL		GW	Sandy fine to coarse GRAVEL with some silt and minor cobbles; brown. Well graded, angular to subangular, greywacke; sand is fine to coarse; cobbles are angular, up to 110 mm, greywacke. Contains organics and ceramic. [FILL] 0.2 m - Cobble content increases to some.					Dense		
1.0	HOLOCENE ALLUVIUM		ML	SILT with minor sand; brownish grey mottled orange. Low plasticity; sand is fine to medium. Contains organics for 200 mm.				M	Very Stiff	130/37	
1.5			ML	Sandy SILT; brownish grey mottled orange. Low plasticity; sand is fine to medium.						153/37	
			SW	Gravelly fine to coarse SAND with minor silt; bluish grey mottled orange. Well graded; gravel is fine to coarse, subrounded to rounded, greywacke.				W	Medium Dense		
			GW	Sandy fine to coarse GRAVEL with minor cobbles; grey. Well graded, subrounded to rounded, greywacke; sand is fine to coarse; cobbles are rounded, up to 160 mm.					Dense		
2.0				Depth of Excavation: 1.8 m Termination Condition: Practical refusal							
2.5											

GEOTECH TEST PIT LOG - PHOTOS RANGIURU TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/16/21



Bucket excavator met practical refusal. at 1.8 m depth .
Scala Penetrometer met practical refusal at 1.8 m depth.
Standing groundwater was not encountered.

LOG OF TEST PIT TP02

Geotechnical Investigation

234 Rangiuru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ **Shear Vane No** : 1371
Date : 15/04/2021 **Logged By** : CM
Max Test Pit Depth : 2.3 m **Reviewed By** : CC
Digger Type/Size : Bucket Excavator **Latitude** : -40.753099
Bucket Type/Size : Toothed / 600 mm wide **Longitude** : 175.1317

Depth (m BGL)	Material	Excavatability (Relative Scale)	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane, Su Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
		Easier	Harder								2 4 6 8 10 12
	FILL		GW	Sandy fine to coarse GRAVEL; grey mixed brown. Well graded, angular to subangular, greywacke; sand is fine to coarse. [FILL]					Dense		
0.5				SILT with minor sand; brownish grey mottled orange. Low plasticity; sand is fine to medium. Contains organics for top 200 mm.					Stiff		
1.0	HOLOCENE ALLUVIUM		ML	0.7 m - Colour changes to brown.				M		181/52	
1.5				1.4 m - Colour changes to grey mottled orange.					Very Stiff to Hard		
2.0			ML	Sandy SILT with minor gravel; bluish grey mottled orange. Low plasticity; sand is fine to medium; gravel is fine to coarse, rounded, greywacke.				W			
2.3				Depth of Excavation: 2.3 m Termination Condition: Practical refusal							

GEOTECH TEST PIT LOG - PHOTOS RANGIURU TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/16/21



Bucket excavator met practical refusal. at 2.3 m depth .
Scala Penetrometer met practical refusal at 2.1 m depth.
Standing groundwater was not encountered.

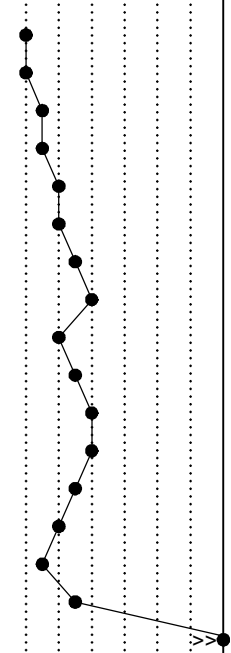
LOG OF TEST PIT TP03

Geotechnical Investigation

234 Rangiuru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ **Shear Vane No** : 1371
Date : 15/04/2021 **Logged By** : CM
Max Test Pit Depth : 1.8 m **Reviewed By** : CC
Digger Type/Size : Bucket Excavator **Latitude** : -40.75261
Bucket Type/Size : Toothed / 600 mm wide **Longitude** : 175.131655

Depth (m BGL)	Material	Excavatability (Relative Scale)	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane, Su Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
		Easier	Harder								2 4 6 8 10 12
	FILL		SM	Silty fine to medium SAND with minor gravel; dark brown. Poorly graded; gravel is fine to medium, angular to subangular, greywacke. Contains organics, rootlets, metal, glass and wood. [FILL]				M	Loose		
0.5								D			
	HOLOCENE ALLUVIUM		ML	SILT with minor sand; brownish grey mottled orange. Low plasticity; sand is fine to medium. Contains organics for top 200 mm.				M	Very Stiff	125/34	
1.0											
1.5											
			GW	Sandy fine to coarse GRAVEL with minor cobbles; grey. Well graded, subrounded to rounded, greywacke; sand is fine to coarse; cobbles are rounded, up to 155 mm.				W	Dense		
2.0				Depth of Excavation: 1.8 m Termination Condition: Practical refusal				S			
2.5											



GEOTECH TEST PIT LOG - PHOTOS RANGIURU TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/16/21



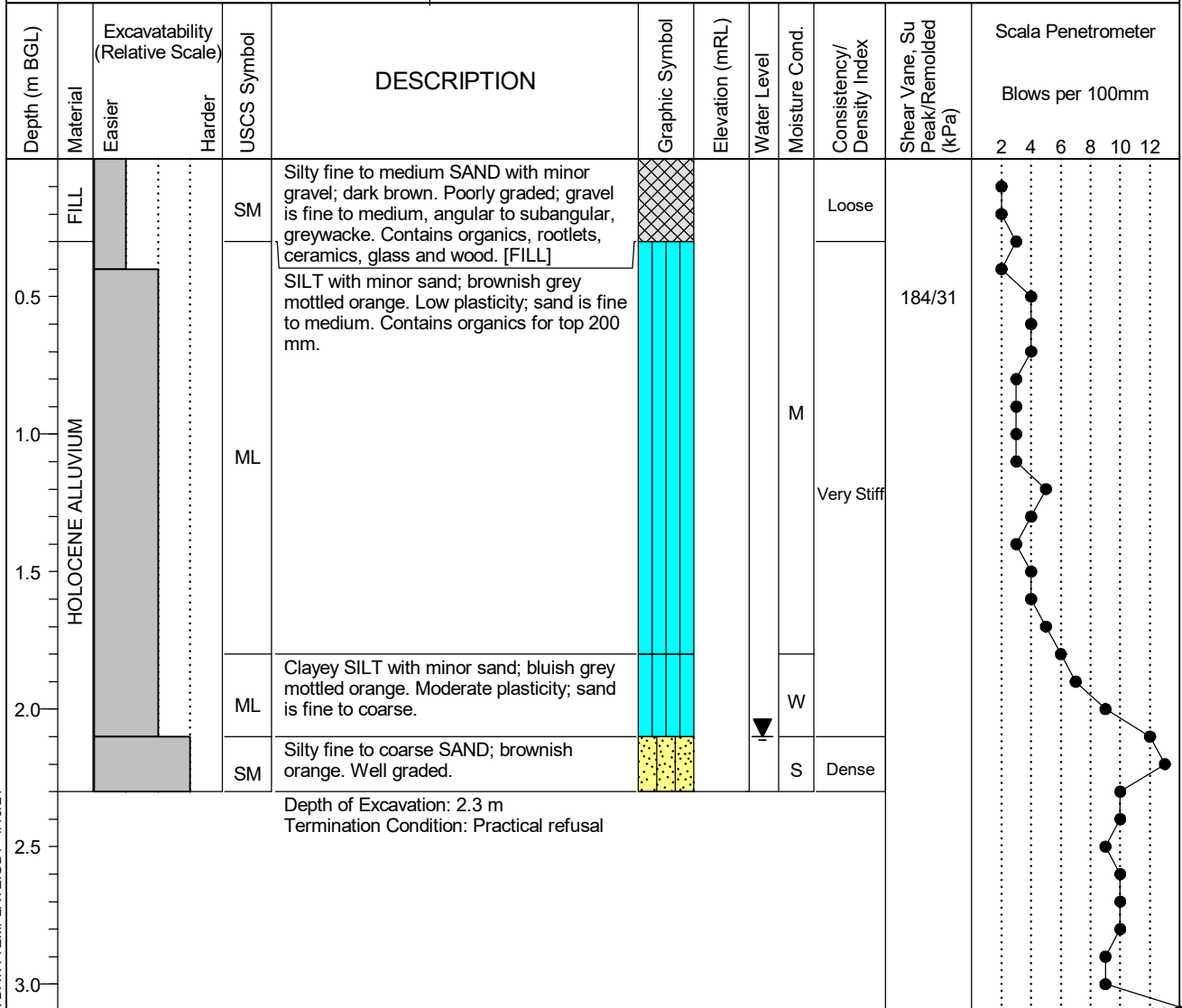
Bucket excavator met practical refusal. at 1.8 m depth .
Scala Penetrometer met practical refusal at 1.7 m depth.
Standing groundwater was encountered at 1.7 m.

LOG OF TEST PIT TP04

Geotechnical Investigation

234 Rangiuru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ **Shear Vane No** : 1371
Date : 15/04/2021 **Logged By** : CM
Max Test Pit Depth : 2.3 m **Reviewed By** : CC
Digger Type/Size : Bucket Excavator **Latitude** : -40.752339
Bucket Type/Size : Toothed / 600 mm wide **Longitude** : 175.131511



GEOTECH TEST PIT LOG - PHOTOS RANGIURU TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/16/21



Bucket excavator met practical refusal. at 2.3 m depth .
Scala Penetrometer met practical refusal at 3.1 m depth.
Standing groundwater was encountered at 2.1 m.

LOG OF TEST PIT TP05

Geotechnical Investigation

234 Rangiuru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ **Shear Vane No** : 1371
Date : 15/04/2021 **Logged By** : CM
Max Test Pit Depth : 1.8 m **Reviewed By** : CC
Digger Type/Size : Bucket Excavator **Latitude** : -40.752447
Bucket Type/Size : Toothed / 600 mm wide **Longitude** : 175.131903

Depth (m BGL)	Material	Excavatability (Relative Scale)	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane, Su Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
		Easier	Harder								2 4 6 8 10 12
	TS		SM	Silty fine to medium SAND; dark brown. Poorly graded. Contains organics and rootlets. [TOPSOIL]					Loose		
0.5			ML	SILT with minor sand; brownish grey mottled orange. Low plasticity; sand is fine to medium. Contains organics for top 200 mm.				M		UTP	
1.0			ML						Very Stiff to Hard	214+	
1.5			ML SM	Clayey SILT with minor sand; bluish grey mottled orange. Moderate plasticity; sand is fine to coarse.			W				
2.0				Silty fine to coarse SAND; brownish orange. Well graded. Depth of Excavation: 1.8 m Termination Condition: Practical refusal			S		Medium Dense		
2.5											

GEOTECH TEST PIT LOG - PHOTOS RANGIURU TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/16/21



Bucket excavator met practical refusal. at 1.8 m depth .
Scala Penetrometer met practical refusal at 2 m depth.
Standing groundwater was encountered at 1.7 m.

TS = Topsoil, UTP = Unable to Penetrate.

LOG OF TEST PIT TP06

Geotechnical Investigation

234 Rangiuru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ **Shear Vane No** : 1371
Date : 15/04/2021 **Logged By** : CM
Max Test Pit Depth : 2.1 m **Reviewed By** : CC
Digger Type/Size : Bucket Excavator **Latitude** : -40.753022
Bucket Type/Size : Toothed / 600 mm wide **Longitude** : 175.131949

Depth (m BGL)	Material	Excavatability (Relative Scale)	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane, Su Peak/Remolded (kPa)	Scala Penetrometer
		Easier	Harder								Blows per 100mm
											2 4 6 8 10 12
	TS		SM	Silty fine to medium SAND; dark brown. Poorly graded. Contains organics and rootlets. [TOPSOIL]					Loose to Medium Dense		
0.5			ML	SILT with minor sand; brownish grey mottled orange. Low plasticity; sand is fine to medium. Contains organics for top 200 mm.				M		214+	
1.0									Very Stiff		
1.5											
2.0			ML	Clayey SILT with minor sand; bluish grey mottled orange. Moderate plasticity; sand is fine to coarse.				W			
			SM	Silty gravelly fine to coarse SAND; brownish orange. Well graded; gravel is fine to coarse, rounded, greywacke.				S	Medium Dense to Dense		
				Depth of Excavation: 2.1 m Termination Condition: Practical refusal							
2.5											

GEOTECH TEST PIT LOG - PHOTOS RANGIURU TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/16/21



Bucket excavator met practical refusal. at 2.1 m depth .
Scala Penetrometer met practical refusal at 2.1 m depth.
Standing groundwater was encountered at 2 m.

TS = Topsoil.

LOG OF TEST PIT TP07

Geotechnical Investigation

234 Rangiuru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ **Shear Vane No** : 1371
Date : 15/04/2021 **Logged By** : CM
Max Test Pit Depth : 2.2 m **Reviewed By** : CC
Digger Type/Size : Bucket Excavator **Latitude** : -40.753367
Bucket Type/Size : Toothed / 600 mm wide **Longitude** : 175.132164

Depth (m BGL)	Material	Excavatability (Relative Scale)	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane, Su Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
		Easier	Harder								2 4 6 8 10 12
0.0	TS		SM	Silty fine to medium SAND; dark brown. Poorly graded. Contains organics and rootlets. [TOPSOIL]				D	Medium Dense		
0.5			ML	SILT with minor sand; brownish grey mottled orange. Low plasticity; sand is fine to medium. Contains organics for top 200 mm.				M	Very Stiff	163/12	
1.0			ML	Clayey SILT with minor sand and gravel; bluish grey mottled orange. Moderate plasticity; sand is fine to coarse; gravel is fine to coarse, rounded, greywacke.				W			
1.5			GM	Silty sandy fine to coarse GRAVEL; brownish orange. Well graded, rounded, greywacke; sand is fine to coarse.				S	Tightly Packed		
2.0				Depth of Excavation: 2.2 m Termination Condition: Practical refusal							
2.5											

GEOTECH TEST PIT LOG - PHOTOS RANGIURU TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/16/21



Bucket excavator met practical refusal. at 2.2 m depth .
Scala Penetrometer met practical refusal at 1.7 m depth.
Standing groundwater was encountered at 1.9 m.

TS = Topsoil.

LOG OF TEST PIT TP08

Geotechnical Investigation

234 Rangiuru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ **Shear Vane No** : 1371
Date : 15/04/2021 **Logged By** : CM
Max Test Pit Depth : 2.1 m **Reviewed By** : CC
Digger Type/Size : Bucket Excavator **Latitude** : -40.753268
Bucket Type/Size : Toothed / 600 mm wide **Longitude** : 175.132759

Depth (m BGL)	Material	Excavatability (Relative Scale)	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/Density Index	Shear Vane, Su Peak/Remolded (kPa)	Scala Penetrometer
		Easier	Harder								Blows per 100mm
											2 4 6 8 10 12
0.0	TS		SM	Silty fine to medium SAND; dark brown. Poorly graded. Contains organics and rootlets. [TOPSOIL]				D	Loose		
0.5			ML	SILT with minor sand; brownish grey mottled orange. Low plasticity; sand is fine to medium. Contains organics for top 200 mm.				M	Very Stiff to Hard		
1.0											
1.5											
2.0			ML	Clayey SILT with minor sand; bluish grey mottled orange. Moderate plasticity; sand is fine to coarse.				W			
			GM	Silty sandy fine to coarse GRAVEL; brownish orange. Well graded, rounded, greywacke; sand is fine to coarse.				S	Dense		
				Depth of Excavation: 2.1 m Termination Condition: Practical refusal							
2.5											

GEOTECH TEST PIT LOG - PHOTOS RANGIURU TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/16/21



Bucket excavator met practical refusal. at 2.1 m depth .
Scala Penetrometer met practical refusal at 2.1 m depth.
Standing groundwater was encountered at 2 m.

TS = Topsoil, UTP = Unable to Penetrate.

LOG OF TEST PIT TP09

Geotechnical Investigation

234 Rangiuru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ **Shear Vane No** : 1371
Date : 15/04/2021 **Logged By** : CM
Max Test Pit Depth : 2.1 m **Reviewed By** : CC
Digger Type/Size : Bucket Excavator **Latitude** : -40.752767
Bucket Type/Size : Toothed / 600 mm wide **Longitude** : 175.133455

Depth (m BGL)	Material	Excavatability (Relative Scale)	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane, Su Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
		Easier	Harder								2 4 6 8 10 12
0.0	TS		SM	Silty fine to medium SAND; dark brown. Poorly graded. Contains organics and rootlets. [TOPSOIL]				D	Medium Dense		
0.5			ML	SILT with minor sand; brownish grey mottled orange. Low plasticity; sand is fine to medium. Contains organics for top 200 mm.				M	Very Stiff to Hard	214+	
1.0			ML	Clayey SILT with minor sand; bluish grey mottled orange. Moderate plasticity; sand is fine to coarse.						UTP	
1.5			SM	Silty gravelly fine to coarse SAND; brownish orange. Well graded; gravel is fine to coarse, rounded, greywacke.				W	Medium Dense		
2.0			GM	Silty sandy fine to coarse GRAVEL; brownish orange. Well graded, rounded, greywacke; sand is fine to coarse.					Medium Dense to Dense		
2.1				Depth of Excavation: 2.1 m Termination Condition: Practical refusal				S			



Bucket excavator met practical refusal. at 2.1 m depth .
Scala Penetrometer met practical refusal at 2 m depth.
Standing groundwater was encountered at 2 m.

TS = Topsoil, UTP = Unable to Penetrate.

LOG OF TEST PIT TP10

Geotechnical Investigation

234 Rangiuru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ **Shear Vane No** : 1371
Date : 15/04/2021 **Logged By** : CM
Max Test Pit Depth : 1.7 m **Reviewed By** : CC
Digger Type/Size : Bucket Excavator **Latitude** : -40.752142
Bucket Type/Size : Toothed / 600 mm wide **Longitude** : 175.133093

Depth (m BGL)	Material	Excavatability (Relative Scale)	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane, Su Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
		Easier	Harder								2 4 6 8 10 12
0.0	TS		SM	Silty fine to medium SAND; dark brown. Poorly graded. Contains organics and rootlets. [TOPSOIL]				D	Loose to Medium Dense		
0.5			ML	SILT with minor sand; brownish grey mottled orange. Low plasticity; sand is fine to medium. Contains organics for top 200 mm.				M	Very Stiff to Hard	214+	
1.0										UTP	
1.5			GM	Silty sandy fine to coarse GRAVEL with some cobbles; bluish grey mixed brownish orange. Well graded, rounded, greywacke; sand is fine to coarse; cobbles are rounded, up to 100 mm.			W		Medium Dense to Dense		
							S				
2.0				Depth of Excavation: 1.7 m Termination Condition: Practical refusal							
2.5											

GEOTECH TEST PIT LOG - PHOTOS RANGIURU TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/16/21



Bucket excavator met practical refusal. at 1.7 m depth .
Scala Penetrometer met practical refusal at 1.5 m depth.
Standing groundwater was encountered at 1.5 m.

TS = Topsoil, UTP = Unable to Penetrate.

LOG OF TEST PIT TP11

Geotechnical Investigation

234 Rangiuru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ **Shear Vane No** : 1371
Date : 15/04/2021 **Logged By** : CM
Max Test Pit Depth : 1.7 m **Reviewed By** : CC
Digger Type/Size : Bucket Excavator **Latitude** : -40.752424
Bucket Type/Size : Toothed / 600 mm wide **Longitude** : 175.132303

Depth (m BGL)	Material	Excavatability (Relative Scale)	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane, Su Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
		Easier	Harder								2 4 6 8 10 12
0.0	TS		SM	Silty fine to medium SAND; dark brown. Poorly graded. Contains organics and rootlets. [TOPSOIL]				D	Loose		
0.5			ML	SILT with minor sand; brownish grey mottled orange. Low plasticity; sand is fine to medium. Contains organics for top 200 mm.				M	Very Stiff to Hard		
1.0											
1.5			ML	Clayey SILT with minor sand; bluish grey mottled orange. Moderate plasticity; sand is fine to coarse.				W			
			GM	Silty sandy fine to coarse GRAVEL with some cobbles; bluish grey mixed brownish orange. Well graded, rounded, greywacke; sand is fine to coarse; cobbles are rounded, up to 100 mm.				S	Dense		
2.0				Depth of Excavation: 1.7 m Termination Condition: Practical refusal							
2.5											

UTP

GEOTECH TEST PIT LOG - PHOTOS RANGIURU TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/16/21



Bucket excavator met practical refusal. at 1.7 m depth .
Scala Penetrometer met practical refusal at 1.6 m depth.
Standing groundwater was encountered at 1.6 m.

TS = Topsoil, UTP = Unable to Penetrate.

LOG OF TEST PIT TP12

Geotechnical Investigation

234 Rangiuru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ **Shear Vane No** : 1371
Date : 15/04/2021 **Logged By** : CM
Max Test Pit Depth : 1.7 m **Reviewed By** : CC
Digger Type/Size : Bucket Excavator **Latitude** : -40.752836
Bucket Type/Size : Toothed / 600 mm wide **Longitude** : 175.132557

Depth (m BGL)	Material	Excavatability (Relative Scale)	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane, Su Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
		Easier	Harder								2 4 6 8 10 12
0.0	TS		SM	Silty fine to medium SAND; dark brown. Poorly graded. Contains organics and rootlets. [TOPSOIL]				D	Loose to Medium Dense		
0.5			ML	SILT with minor sand; brownish grey mottled orange. Low plasticity; sand is fine to medium. Contains organics for top 200 mm.				M	Very Stiff to Hard	214+	
1.0											
1.5			GM	Silty sandy fine to coarse GRAVEL with some cobbles; bluish grey mixed brownish orange. Well graded, rounded, greywacke; sand is fine to coarse; cobbles are rounded, up to 100 mm.			W S		Dense		
2.0				Depth of Excavation: 1.7 m Termination Condition: Practical refusal							
2.5											

GEOTECH TEST PIT LOG - PHOTOS RANGIURU TP LOGS.GPJ NZ MASTER DATA TEMPLATE.GDT 4/16/21



Bucket excavator met practical refusal. at 1.7 m depth .
Scala Penetrometer met practical refusal at 1.5 m depth.
Standing groundwater was encountered at 1.6 m.

TS = Topsoil.



LOG OF HAND AUGER PS01

Geotechnical Investigation
234 Rangiorua Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 30/03/2022
Hole Depth : 0.1 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.752788
Longitude : 175.133151

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor gravel and organics; light brown. Low plasticity; sand is fine to medium; gravel is fine to medium, subrounded, Greywacke.				M			
End of Hole Depth: 0.1 m Termination Condition: Target depth										
Hand auger met target depth at 0.1 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS02

Geotechnical Investigation
234 Rangioru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 30/03/2022
Hole Depth : 0.1 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.752842
Longitude : 175.133234

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor organics; light brown. Low plasticity; sand is fine to medium.				M			
End of Hole Depth: 0.1 m Termination Condition: Target depth										
Hand auger met target depth at 0.1 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS03/03a

Geotechnical Investigation
234 Rangiora Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 30/03/2022
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.75283
Longitude : 175.131644

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
0.5	TOPSOIL	OL	[TOPSOIL] Organic, sandy SILT; light brown. Low plasticity; sand is fine to medium.				M			
	ALLUVIUM	ML	SILT with minor sand; greyish brown mottled. Low plasticity; sand is fine to medium.							
End of Hole Depth: 0.5 m Termination Condition: Target depth										
Hand auger met target depth at 0.5 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS04/04a

Geotechnical Investigation
234 Rangiora Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 30/03/2022
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.75281
Longitude : 175.131965

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor organics; light brown. Low plasticity; sand is fine to medium.				M			
	ALLUVIUM	ML	SILT with minor sand; greyish brown mottled. Low plasticity; sand is fine to medium.				M			
0.5	End of Hole Depth: 0.5 m Termination Condition: Target depth									
Hand auger met target depth at 0.5 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS05/05a

Geotechnical Investigation
234 Rangioru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 30/03/2022
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.752621
Longitude : 175.131875

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
0.5	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor organics; light brown. Low plasticity; sand is fine to medium.				M			
	ALLUVIUM	ML	SILT with minor sand; greyish brown mottled. Low plasticity; sand is fine to medium.							
End of Hole Depth: 0.5 m Termination Condition: Target depth										
Hand auger met target depth at 0.5 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS06/06a

Geotechnical Investigation
234 Rangioru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 30/03/2022
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.752449
Longitude : 175.131513

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor gravel and organics; light brown. Low plasticity; sand is fine to medium; gravel is fine to medium, subrounded, Greywacke.				M			
	ALLUVIUM	ML	SILT with minor sand; greyish brown mottled. Low plasticity; sand is fine to medium.							
0.5	End of Hole Depth: 0.5 m Termination Condition: Target depth									
Hand auger met target depth at 0.5 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS07/07a

Geotechnical Investigation
234 Rangioru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 30/03/2022
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.75227
Longitude : 175.131857

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL]Sandy SILT with minor organics; light brown. Low plasticity; sand is fine to medium.				M			
	ALLUVIUM	ML	SILT with minor sand; greyish brown mottled. Low plasticity; sand is fine to medium.							
0.5	End of Hole Depth: 0.5 m Termination Condition: Target depth									
Hand auger met target depth at 0.5 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS08/08a

Geotechnical Investigation
234 Rangiora Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 05/04/2022
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.75262
Longitude : 175.132328

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor organics; light brown. Low plasticity; sand is fine to medium.				M			
	ALLUVIUM	ML	SILT with minor sand; greyish brown mottled. Low plasticity; sand is fine to medium.				M			
End of Hole Depth: 0.3 m Termination Condition: Target depth										
0.5										
Hand auger met target depth at 0.3 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS09/09a

Geotechnical Investigation
234 Rangiora Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 05/04/2022
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.753064
Longitude : 175.132398

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor organics; light brown. Low plasticity; sand is fine to medium.				M			
	ALLUVIUM	ML	SILT with minor sand and trace gravel; greyish brown. Low plasticity; sand is fine to medium; gravel is fine to coarse, subrounded, Greywacke.				M			
End of Hole Depth: 0.3 m Termination Condition: Target depth										
0.5										
Hand auger met target depth at 0.3 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS10/10a

Geotechnical Investigation
234 Rangiora Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 05/04/2022
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.75222
Longitude : 175.132639

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor organics; light brown. Low plasticity; sand is fine to medium.				M			
	ALLUVIUM	ML	SILT with minor sand and trace gravel; greyish brown. Low plasticity; sand is fine to medium; gravel is fine to coarse, subrounded, Greywacke.				M			
End of Hole Depth: 0.3 m Termination Condition: Target depth										
0.5										
Hand auger met target depth at 0.3 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS11/11a

Geotechnical Investigation
234 Rangiora Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 05/04/2022
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.752618
Longitude : 175.132661

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor organics; light brown. Low plasticity; sand is fine to medium.				M			
	ALLUVIUM	ML	SILT with minor sand; greyish brown mottled. Low plasticity; sand is fine to medium.				M			
End of Hole Depth: 0.3 m Termination Condition: Target depth										
Hand auger met target depth at 0.3 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS12/12a

Geotechnical Investigation
234 Rangiora Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 05/04/2022
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.753042
Longitude : 175.132759

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor organics; light brown. Low plasticity; sand is fine to medium.				M			
	ALLUVIUM	ML	SILT with minor sand; greyish brown mottled. Low plasticity; sand is fine to medium.				M			
End of Hole Depth: 0.3 m Termination Condition: Target depth										
0.5										
Hand auger met target depth at 0.3 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS13/13a

Geotechnical Investigation
234 Rangiorua Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 30/03/2022
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.752503
Longitude : 175.13316

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor organics; light brown. Low plasticity; sand is fine to medium.				M			
	ALLUVIUM	ML	SILT with minor sand; greyish brown mottled. Low plasticity; sand is fine to medium.							
0.5	End of Hole Depth: 0.5 m Termination Condition: Target depth									
Hand auger met target depth at 0.5 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS14/14a

Geotechnical Investigation
234 Rangioru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 05/04/2022
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.753126
Longitude : 175.133062

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor organics; light brown. Low plasticity; sand is fine to medium.				M			
	ALLUVIUM	ML	SILT with minor sand and trace gravel; greyish brown. Low plasticity; sand is fine to medium; gravel is fine to coarse, subrounded, Greywacke.				M			
End of Hole Depth: 0.3 m Termination Condition: Target depth										
0.5										
Hand auger met target depth at 0.3 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS15

Geotechnical Investigation
234 Rangiora Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 07/04/2022
Hole Depth : 0.1 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.752788
Longitude : 175.133151

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	OL	[TOPSOIL] Sandy SILT with minor organics; light brown. Low plasticity; sand is fine to medium.				M			
End of Hole Depth: 0.1 m Termination Condition: Target depth										
Hand auger met target depth at 0.1 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS16

Geotechnical Investigation
234 Rangiora Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 07/04/2022
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.752449
Longitude : 175.131513

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	TOPSOIL	ML	[TOPSOIL] Sandy SILT with minor gravel and organics; light brown. Low plasticity; sand is fine to medium; gravel is fine to medium, subrounded, Greywacke.				M			
End of Hole Depth: 0.2 m Termination Condition: Target depth										
Hand auger met target depth at 0.2 m. Standing groundwater was not encountered.										



LOG OF HAND AUGER PS17

Geotechnical Investigation
234 Rangioru Road
Otaki, Kapiti Coast
18634.000.001

Client : Classic Developments NZ
Client Ref. : -
Date : 07/04/2022
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : N/A
Logged By : CM
Reviewed By :
Latitude : -40.75283
Longitude : 175.131644

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	FILL	ML	[TOPSOIL] Sandy SILT with minor gravel and organics; light brown. Low plasticity; sand is fine to medium; gravel is fine to medium, subrounded, Greywacke.				M			
End of Hole Depth: 0.2 m Termination Condition: Target depth										
Hand auger met target depth at 0.2 m. Standing groundwater was not encountered.										

APPENDIX 4: Duplicate Sample Analysis

Relative Percentage Difference Analysis

Analyte	Sample Result (mg/kg)		Duplicate Result (mg/kg)		RPD (%)	Acceptable?
Arsenic	PS01	17	PS15	17	0	Yes
Cadmium		0.49		0.49	0	Yes
Chromium		16		16	0	Yes
Copper		40		42	4.878049	Yes
Lead		49		50	2.020202	Yes
Nickel		15		16	6.451613	Yes
Zinc		111		116	4.405286	Yes
Arsenic	PS03	19	PS17	20	5.128205	Yes
Cadmium		0.3		0.19	44.89796	Yes
Chromium		16		15	6.451613	Yes
Copper		35		40	13.333333	Yes
Lead		28		30	6.896552	Yes
Nickel		14		17	19.35484	Yes
Zinc		99		123	21.62162	Yes
TPH (C15-C36)		69		48	35.89744	Yes
Arsenic	PS06	21	PS16	21	0	Yes
Cadmium		0.2		0.19	5.128205	Yes
Chromium		18		16	11.76471	Yes
Copper		43		45	4.545455	Yes
Lead		47		40	16.09195	Yes
Nickel		16		17	6.060606	Yes
Zinc		93		103	10.20408	Yes